Loan Portfolio and Asset Quality of Commercial Banks Listed At Nairobi Securities Exchange, Kenya

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Abstract:
The lending function is considered as the most important function of any commercial bank, since most of the banks' earnings are generated from interest income. In the past, large number of non-performing loans had contributed quite significantly to low profits in Kenyan banks. Banks are now reviewing their lending portfolios using the laid down criteria such as credit modeling by Basel Committee on Banking Supervision. This study examined the effect of loan portfolio on asset quality of listed commercial banks in Kenya. The specific objectives were to determine the effect of commercial loans, personal loan, government loan and mortgage loan on asset quality of commercial banks. Agency theory, theory of information asymmetry, modern portfolio theory and Loanable Funds Theory informed the study. The study adopted a descriptive research design approach where the target population was based on 11 commercial banks listed at the Nairobi Securities Exchange. This study covered a 5-year period from 2017 to 2021. The study used secondary data that was extracted from the websites of the respective commercial banks. Both descriptive and inferential statistics were computed using STATA 15. Descriptive statistics included mean, standard deviation, Maximum and minimum. Inferential analysis included Pearson correlation and linear regression analyses. The study used panel regression analytical model. This study conducted serial correlation tests, heteroscedasticity tests and multicollinearity test to evaluate the data collected before the actual analysis The findings revealed that commercial loans, government loans and mortgage loans have significant positive effect on asset quality of listed commercial banks at Nairobi Securities exchange. However, personal loans had insignificant positive effect on asset quality of listed commercial banks at Nairobi Securities exchange. This implied that increase in the utilization of unsecured loans to secured loans in the commercial loan portfolio will results to insignificant increase in asset quality. The study concluded that loan portfolio influence asset quality of listed commercial banks at Nairobi Securities exchange. The study recommended that commercial banks should prioritize short term loans over long terms loans since the borrower's ability to repay a loan is less likely to change significantly over a short frame of time. Management of listed commercial bank should always secure their loans and limit the amount of loans which are not secured. The study recommends that the commercial bank to be sure that the collateral undertaken is protected and will not deteriorate, this costs the bank money. Listed commercial banks should invest more on treasury bonds since they can be traded on the secondary market, giving bond holders the opportunity to receive money for their security without rediscounting.
Key Word: *Commercial Loans, Personal Loans, Government Loans, Mortgage loans, Loan Portfolio, Asset Quality, Commercial Banks, Nairobi Securities Exchange.*

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I.   Introduction

According to Brown, Jappelli and Pagano (2006), banking efficiency is essential for a well-functioning economy and more importantly, the maintenance of sound asset quality is a fundamental aspect of banking. One of the core businesses of banks as financial Institutions is to finance the economy and keep money in circulation. Researchers Demirguc-Kunt and Levine (2007) suggest that banks exert a direct impact on economic growth and development thus it is important that we keep them afloat by ensuring that their books are well maintained ensuring proper inflow and outflow of funds and other financial resource.

Messai and Jouini (2013) concluded that poor bank asset quality threatens the banking system of a developed economy. An increase in NPLs could cause the collapse of a bank, and consequently require intervention from a central bank to preserve stability in the banking sector. Asset quality is an important prudential indicator to assess the financial health of the banking sector. Besides asset quality, Non-Performing Assets (NPAs) epitomize the credit risk management and efficacy in the allocation of resources. The asset quality problems could

be contagious and insidious, and they prey on the weak. Moreover, these problems prey on the weak banks, which are vulnerable and have relatively.

The lending function is considered as the most important function of any commercial bank, since most of the banks' earnings are generated from interest income. In the past, large number of non-performing loans had contributed quite significantly to low profits in Kenyan banks. Banks are now reviewing their lending portfolios using the laid down criteria such as credit modeling by Basel Committee on Banking Supervision. According to Jones and Zeitz (2017), the Basel's goal is to induce bankers to improve their credit management capability. This includes how the institutions schedule form loans, pricing products, and control their operations, to reduce a bank's operational risk during the lending process (Munene, Ndambiri & Wanjohi, 2019).

Commercial banks' lending could be on short, medium and/or long-term basis is a major service rendered by the commercial bank to their customers (Misati & Kamau, 2017). Banks make various types of loans that include commercial and industrial loans, personal loan, government loan and mortgage loan (Machoka & Jagongo, 2020; Nyasaka, 2017; Timsina, 2017). These loan products are key due to Non-Performing Loans (NPLs). NPLs have gained increasing attentions in the last few decades with its negative effect on the banking sector and the economy as a whole. The probability of incurring losses from non-payment of loans or other forms of credit by debtors are mostly encountered in the financial sector particularly by commercial banks (Saleh, 2019).

Virtually all research on the causes of bank and thrift failures find that failing institutions have large proportions of non-performing loans prior to failure, and those non-performing loans are a statistically significant predictor of insolvency (Berger & DeYoung, 1997). Bank failures come with massive effects and costs not only to Banks but also to the economy of a country at large. This, being the immediate reason of Banking crisis occurrences at various times indicates that assessment of non-performing loans and implementation of controlling mechanisms to avoid their occurrence is a continuous process which should be improved from time to time. However, credit risk management is indeed a very difficult and complex task in the financial industry because of the unpredictable nature of the macroeconomic factors coupled with the various microeconomic variables which are peculiar to the banking industry or specific to a particular bank (Garr, 2013). Therefore, identifying the factors that cause non-performing loans is key to the implementation of mechanisms that facilitate the avoidance of their occurrence. The causes for nonperforming loans vary in different countries. Theoretically there are so many reasons as to why loans fail to perform. Some of these include portfolio quality, depressed economic conditions, high real interest rate, inflation, lenient terms of credit, credit orientation, high credit growth and risk appetite, and poor monitoring among others. The causes of nonperforming loans can be categorized in to type of loan portfolio (Emmanuel, 2014).

The Kenyan financial sector has experienced huge changes over the last two decades. A ton of changes has been attempted in the sector that has prompted multiplication of financial products/items, activities and organizational structures that have enhanced and expanded the proficiency of the financial framework. All these improvements, combined with changes in the global financial sector and the expanding mix of domestic and worldwide financial markets, have prompted quick financial development. The increasing importance of the financial industry in present-day economies, caused by the quick rate of advancement in this sector, has led to the need to study financial innovation (CBK, 2018). Locally, the Kenya Bankers Association (2019) noted that the rate of deposits rose from 6 percent in 2016 to 11 percent in 2018, the loans rate of growth dropped being 2 percent in 2018 compared to 6 percent and 4 percent in 2016 and 2017 respectively. Consequently, the loans to deposits ratio declined from 84 percent in 2016 to 74 percent in 2018. This signals the imperative need for analyzing the loan products by the Commercial banks. In Kenya, Commercial banks observes the creditworthiness of the clients by checking in the credit report agencies and bureaus for instance Credit Reference Bureau (CRB) that issue the credit rating scores (Muigai & Maina, 2018). The commercial banks thus take a calculated risk by lending the loans to clients and awaits the payment when the credit gets due (Nyasaka, 2017).

In at least half of the bank failures, insider loans accounted for a substantial proportion of the bad debts. Most of the larger local bank failures in Kenya, such as the Continental Bank, Trade Bank and Pan African Bank, involved extensive insider lending, often to politicians. The threat posed by insider lending to the soundness of the banks was exacerbated because many of the insider loans were invested in speculative projects such as real estate development, breached large-loan exposure limits, and were extended to projects which could not generate short-term returns (such as hotels and shopping centres), with the result that the maturities of the bank's assets and liabilities were imprudently mismatched. He cites three forces behind insider lending and lists them as political pressure, under-capitalization, over concentration in ownership.

Statement of the Problem

Loan is one of the major product/asset provided by the bank but it is also the riskiest product because of the credit risk. Non-performing Loans (NPLs) create an adverse impact on the bank's balance sheet and income statement, overall financial institutions profitability and economic growth of a country. The Central Bank of

Kenya has issued a directive which strictly requires all banks to maintain ratio of their non-performing assets below five percent as it is the case, where the Basel standard of NPL ratio is also 5 percent.

However, according to the latest data from the Central Bank of Kenya(CBK), non-performing asset reduced from 2006 in 18.9% to 4.4% in 2011. From 2011 to 2015, it increased to 6.0%, then it increased to 9.9% in 2017, 12.0% in 2018 and 2019 before increasing to 14.0% in 2020. Majority of banks (41 per cent) loan defaults to fell in the quarter ending December 2021 (CBK, 2022). With the projection in the rise of non-performing loan, the effect relays a negative impact on the loan portfolio for the commercial banks. This in the long run affects banks' lending to various economic sectors which would affect the economy growth (Timsina, 2014). In addition, examining commercial bank loans and their relationship with asset quality is important because business cycles affect the banking sector, and hence, bank lending (Beck, Jakubik & Piloiu, 2018).

Studies conducted in these area present research gaps. Ngondo (2018) study on the effect of lending rate on asset quality of commercial banks in Kenya presents a research gap as it focused on liquidity and capital adequacy while the current study focused on the loan portfolio. The study by Njeri (2016) on loan portfolio of commercial banks in Kenya focused on the operational structures and used a questionnaire while the current study focused on asset quality while measuring using secondary data. Tmava, Avdullahi and Sadikaj (2018) analyzed and compare the loan portfolio and NPLs in the Western Balkan countries for the period 2008-2015. The results show that the NPL have had a growing trend in the post-global financial crisis, with different variations. However, the study was conducted in developed countries making it difficult to be applied in developing countries like Kenya. This study is imperative because commercial banks in Kenya need to enhance their asset quality through their loan portfolio.

Objectives of the Study
i) To ascertain the influence of commercial loans on asset quality of listed commercial banks at Nairobi Securities Exchange.
ii) To evaluate the influence of personal loan on asset quality of listed commercial banks at Nairobi Securities Exchange.
iii) To assess influence of government loan on asset quality of listed commercial banks at Nairobi Securities Exchange.
iv) To establish influence of mortgage loan on asset quality of listed commercial banks at Nairobi Securities Exchange.

II. Literature Review
Theoretical Framework
Portfolio Theory
The Portfolio theory was developed by Markowitz (1952) and first presented in his seminal paper on portfolio selection. The theory has since been modified by several researchers to be what is now commonly referred to as the Modern Portfolio Theory (MPT). MPT currently forms a cornerstone of finance and is widely accepted and applied in the field of finance and economics. The model suggests that organizations must diversify their portfolios to achieve maximum returns while at the same time reducing the risk in the portfolio. According to the portfolio theory, diversification is achieved through the allocation of resources to securities that promise maximum returns and minimum variance (Madan, 2018). Markowitz further posits that the securities with the highest expected returns are not necessarily the ones with the least variance. Due to the intercorrelation of the securities' returns, diversification cannot eliminate all variance, and therefore the portfolio with maximum expected returns is not necessarily the one with the least variance (Llano-Paz, Calvo-Silvosa, Antelo & Soares, 2017). The Portfolio Theory is relevant to the study as it informs the banks to design a portfolio to maximize returns by accepting a quantifiable amount of risk on their key loan products that include issuance of commercial loans, personal loan, government loan and mortgage Loans. Portfolio diversification can help banks steer away from densely populated industry sectors and discover underserved markets.

Agency Theory
Agency theory was developed by Jensen and Meckling (1976) and argues for a clear separation of the responsibilities of the principals and the agents. Agency Theory argues that an agency relationship exists when one or more persons (the principal(s)) engage another person (the agent) to perform some service on theory behalf which involves delegating some decision-making authority to the agent. They argued that there is an increase in the gap between ownership and the control of large organizations that is precipitated by a decrease in equity ownership (Roshan, 2016). This situation provided an opportunity for the managers to pursue their own interests rather than maximizing returns to the shareholders. The top managers make decisions that increase the value of the firms because they often own shares in the firm in which they are working. Additionally, the managers are hired and retained by the board of directors who are elected by stockholders (Berk & DeMarzo, 2017). This

conflict is best depicted in situations where the company is experiencing financial distress. In such situations, managers make decisions that protect the shareholders but disadvantage the creditors (Jensen & Meckling, 2016). Agency theory posits that optimal capital structure may result from minimizing the costs generated by the conflicts of interest between the firm's various stakeholders. On the other hand, pecking order theory suggests that no optimal financial performance exists; proponents of the theory argue that firms resort to debt financing only when earnings are unsatisfactory and only as a last resort do they opt for risky external financing. Agency theory is relevant to the study as it suggests that there are other factors such as the actions of the management in financial decisions that can affect the loan products for commercial banks.

Theory of Information Asymmetry

Stiglitz (1961), Akerlof (1970) and Spence (1973) are the three proponents' economists who developed theory of asymmetric information. Asymmetric information is a problem in financial markets such as borrowing and lending. In these markets the borrower is more informed about his financial state than the lender. This results in market failure. In a perfect market setting, with perfect and costless information available to both parties, and no uncertainties regarding present and future trading conditions, the parties do not suffer from market failure of information.In a perfect market setting, with perfect and costless information available to both parties, and no uncertainties' regarding present and future trading conditions, the parties do not suffer from market failure of information (Andrei, Cujean, & Wilson, 2018). However, information in the real world is neither perfect nor costless, and additionally small businesses finance market is characterized by risk and uncertainty regarding future conditions. Information is distributed asymmetrically between the lender and borrower. From the lenders perspective, it has incomplete information with regard to underlying quality of the project and the management of small firms, giving rise to the problem of adverse selection (Fama & French, 2014). Theory of Information Asymmetry is relevant in the study on the application of information asymmetry in bank lending based on the information available. Different financing instruments are employed to secure loans. A major factor in decision-making is the information relevant to the matter at hand. If the necessary information is asymmetrically disclosed among the users, it can lead to different views on the same matter thus affecting the loan lending practice.

The Loanable Funds Theory of Interest

The loanable funds theory of interest was propagated by Knut Wicksell (Wicksell, 1936). The loanable funds theory of interest asserts that the interest rate is determined by the demand for and supply of loanable funds (Burton & Brown, 2009). According to Burton and Brown (2009), loanable funds constitute all forms credits for instance savings deposits, bonds, and loans. The theory is based on the several assumptions. First, the integration of markets for loanable funds which is furthermore characterized by the perfect mobility of funds. Second, there is perfect competition. The theory further assumes that interest rate does not interact with other macro variables. Based on these assumptions, Kenyan mortgage originators can source for cheaper long term finance from the global financial system which offers cheaper interest rates as compared to the local financial system. In addition, the originators can negotiate with global financial institutions for better rates and repayment terms. In this light, Kenyan mortgage would not fund their mortgage facilities with funding from short term deposits. Consequently, originators will reduce mismatch risk significantly and be in better position of offering market oriented products. This is will in turn positively influence profitability and market return. For this study, the loanable funds theory of interest was used in analyzing its applicability of managing mismatch risk by mortgage firms in Kenya.

Conceptual Review

The framework illustrates how variables are linked and related to each other. The variables, in this case, are the independent (explanatory) along with the dependent variable (response). Notably, an independent variable affects and determines the effect of another variable. The figurative illustration of the dependent and independent variables in this study is shown below in the conceptual framework.
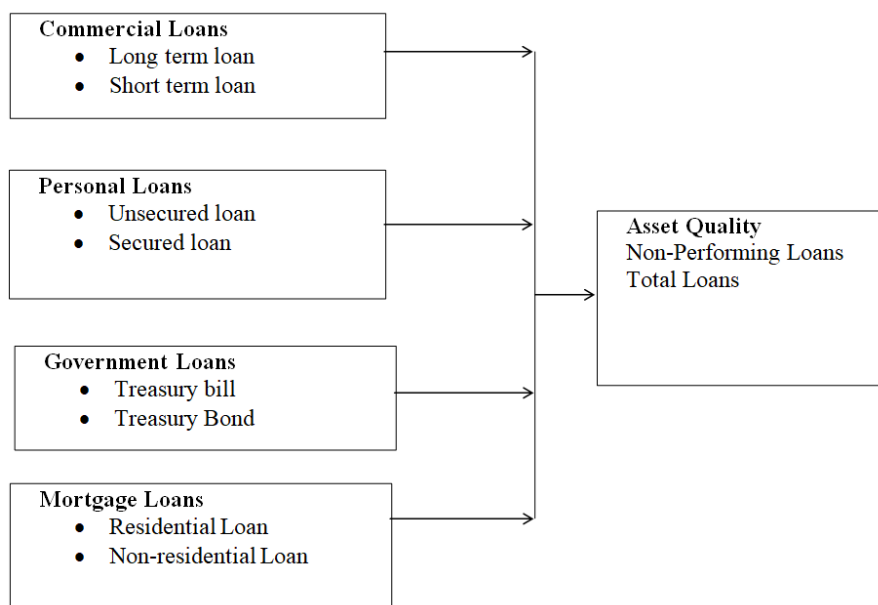
Figure 1.0: Conceptual Framework

Empirical Review
Commercial loans and Asset quality
Ngari (2021) examined the effect of loan products on asset quality of commercial banks in Kenya. The results indicated a positive and significant relationship between commercial loans and the asset quality of commercial banks.Sile, Olweny and Sakwa (2019) examined and evaluated commercial loans and banks asset quality in Kenya using secondary data obtained from the annual reports and accounts of the 11 banks in Kenya listed in Nairobi securities exchange based on annual reports with a sample interval of six-year period from 2012 to 2017. The findings revealed that asset quality had a statistically significant relationship and is influenced by commercial loans.Kakozi (2017) intended to examine factor that affect quality of loan portfolio using non-performing loans (NPLs) as proxy variable in Tanzania for the period of 2006 to 2013. The study finding shows that there is no significant impact of banks specific variables and loan products on bank asset quality except for commercial loans. The study finding reveals that banks specific variables (bank size, profitability, bank liquidity, capital adequacy, and operating efficiency) contribute to quality of loan portfolio, whereas profitability measured by ROA and NIM decreases quality of bank loans portfolio. This suggests that management of banks concentrate in increasing loan portfolio with the view of increasing asset quality which in turn increases risk of non-performing loans. Izundu, Nwakoby and Adigwe (2017) explored the influence of commercial loans allocation on the non-performing loans of deposit money banks in Nigeria. The findings showed that the combined commercial loans allocation variable explained 54% of changes in the banks' profits. The study found that asset allocation was a crucial financial management tool for raising banks' non-performing loans. The study concluded that investments in equities had a positive but inconsequential effect on asset quality.

Government loan and Asset quality
Gerace and Smark (2018) investigated effect of government loans on bank's asset quality. Cluster analysis method was utilized to establish if there were cases of any structural variances within the sample. The study established that the degree and direction of diversification results into altered asset qualitys of an institution. The study found out that government loan whether related or not related adversely affected debt. The research established that strategy negatively influence on leverage. However, with transaction costs, companies don't alter their levels of debts automatically but use target adjustment model. Maina (2017) investigated government loan effect on asset quality of microfinance companies. The research findings indicated that the government loan had a negative effect on ROA indicator and ROE indicator were on a growth pace from 2012 to 2016. However, the study failed to identify the nature of government loan whether horizontal, vertical or corporate since each one of them has its own impact on the asset quality. Mwangangi (2018) conducted a research to ascertain the correlation existing between government loan and the asset quality of banks listed at the Nairobi Securities exchange. This research found an inverse, insignificant correlation between government loan and asset quality. The study reviewed that an increase in loan performance as a result of government loan is negatively affected by trade credit risks and the associated costs, therefore having a negative effect to the asset quality. Kisengese (2014) conducted a study on the impact of government loans on the level of non-performing loans of commercial banks in Kenya.

The findings were that all banks had challenges with non-performing loans; that sharing of customer credit information affected non-performing loans as it helped banks to decline to lend to chronic defaulters; that including all credit history from other credit suppliers would increase credit approval by commercial banks; while a low default rate would result from lending to borrowers based solely on all credit suppliers' positive information, which would increase credit approval by commercial Banks.

Personal loan and Asset quality

Abata (2018) studied personal loan and loan performance for the commercial banks in Nigeria. The study results showed that there was enhanced reduction of the bad debt when the loans were secured with an asset unlike in the case where the loans were not secured. Moreover, the assets were liquidated to obtain the cash for the non-performing loans which resulted in a positive contribution to the loan portfolio for the commercial banks. The study, therefore, acknowledged the significance of asset-based financing in sustaining the value of the loan portfolio. Cappiello, Kadareja, Sorensen and Protopapa (2017) sought to investigate whether personal loan and credit standards had an effect on asset quality of commercial banks. The study adopted a panel approach for the Euro area. The study presented empirical evidence regarding the existence of a bank lending channel of monetary policy transmission in the Euro area. In contrast to previous findings from the United States, the study revealed that the Euro area changes in respect of personal loan, both in terms of volumes and credit standards. Kariuki (2020) assessed the relationship between personal loan and loan performance of commercial banks in Kenya. The study involved all the 43 commercial banks operating in the country. According to the findings of the study, it was confirmed that indeed personal loan and liquidity had varying strengths of relationship with the asset quality of motor vehicle financing of the surveyed commercial banks. Moreover, it was established that interest rates positively influenced the asset quality of the motor vehicle financing realized by the studied banks.

Effect of Mortgage loan on Asset quality

Andelinovic, Samodol and Pavkovic (2018) conducted a study on mortgage loan allocation and asset quality of commercial banks. The researchers collected data from the published accounts of the insurance organizations for the years 2008 to 2016. The data collected was analyzed using cluster analysis and panel data analysis techniques. Cluster analysis was employed for the classification of insurers according to their investment strategies and its results used in the prediction of the changes in asset allocation that financial regulation would bring. The study revealed that loans in real assets had a positive and significant impact on the asset quality of Croatian commercial banks. Bhuyan et al. (2019) studied the effect of real estate investments as a portfolio diversification in commercial banks on asset quality. The researchers collected data from the US financial markets for the period 2012 to 2017 to determine the magnitude and benefits of Mortgage Real Estate Investment Trust (MREIT). The study observed that small banks did not significantly benefit from diversification using MREITs. Further, the research revealed that MREITs turn out to be the worst asset class to be used in portfolio diversification. The study recommended that small banks should not use MREITs for diversification. Ndururi (2018) using primary data found that banks use mortgage financing to improve their overall performance. While the author attempted to show how mortgage finance influences bank performance, the use of interviews is not reliable enough to conclude on whether bank performance is influenced by mortgage finance. Onchomba, Njeru and Memba (2018) examined the influence of mortgage loan on asset quality of commercial banks in Kenya and a corresponding hypothesis was formulated and tested. Research findings established that mortgage loan influence the asset quality of commercial banks. The study findings are supported by the Utilization of modern portfolio theory. Koetter and Poghosyan (2018) studied German real estate financial institutions with a view to find out the relationship between asset quality and real estate markets over the period 2007 to 2016. The study highlighted that the value of collateral grows the real estate property prices of which ultimately leads to reduction in commercial banks asset quality level. There moreover exists substantial positive association between banks asset quality distress and the price proportion to rent. The study further found that banks asset quality distress is further affected by segmentation of the real estate market. Bello and Adewusi (2019) did a comparative study analyzing the performance of real estate and financial assets as security for mortgage lending in Nigeria with a view to ascertain whether or not the drift towards financial assets is justified. The study involved landed and financial assets to test the difference between two population means and revealed that though the banks still prefer financial assets, both real estate and financial assets provided cover for the secured loans. Moreover, the study revealed that real estate portfolio yields superior performance in the long run and exhibited higher growth compared to financial assets over the entire loan period. It is in this basis that the study discovered that most of the sampled banks preferred financial assets as security than real estate's yet the results of the hypotheses testing indicated that both assets proved adequate but real estate appreciated steadily over the period yielding better asset quality.

III. Material and Methods

The study adopted descriptive research design approach. Mugenda and Mugenda (2003) assert that descriptive research design is applicable majorly when the objectives of the study are systematic. The target population was the 11 commercial banks in Kenya listed at Nairobi Securities Exchange as at 31st December 2021 (NSE, 2022). Census technique is suitable when the levels of accuracy and reliability required in the study are very high. Additionally, census was preferred when the members of the population are few. This research used census technique to study the 11 commercial banks listed at NSE. The research adopted the use of secondary data. Data was collected covering 5 years from 2017 to 2021. The research used a panel regression model using STATA software. The study used descriptive statistics comprising of mean, standard deviation, minimum and maximum. Brooks (2008) asserts that panel data regression is preferred in conditions where the data at hand comprises both time series and cross-sectional components. This is because panel data can address a wider range of issues and more sophisticated problems than the classic cross-sectional data or the perfect time-series. Gujarat (2004) considers panel data to be desirable because it incorporates more information in the model, that is, it combines variability across time and cross-section units.

IV. Result and Discussion

Descriptive Analysis

In order to describe the features and characteristics of the data set, the study computed descriptive statistics. It provided a summary of the data and measures used in the study. Some of the descriptive statistics that were used were measure of spread as well measure of central tendency. In this study, measure of spread used included minimum, vales, variance, standard deviation and maximum values. The measures of central tendency in this data set include mean. The study calculated standard deviation, mean, maximum and minimum value for all the variables bot dependent variables (Asset quality) and the independent variables (commercial loans, personal loan, government loans and mortgage loan). The descriptive statistics for the variable are presented in Table 1.

Table 1: Descriptive Statistics

	Asset quality	Commercial Loans	Personal Loans	Government Loans	Mortgage Loans
N	55	55	55	55	55
Min	0.017448	0.109456	0.011058	0.039097	0.04224
Max	0.570076	4.774599	1.170543	26.87692	25.22182
Mean	0.158551	0.902391	0.222163	4.232984	2.238124
Std Dev	0.129217	0.825795	0.262924	10.78261	4.670022
Skewness	0.450171	0.706025	-0.31051	0.31286	1.555256
Kurtosis	1.892521	2.799237	1.224917	1.516267	5.762825

From Table 1, commercial loan was calculated as ratio of long term loan to short term loan and it ranged from 0.109 to 4.77 with a mean of 0.909 and standard deviation of 0.825. Personal loan was calculated this as ratio of unsecured loan to secured loan. Between 2017 and 2021, personal loan ranged from 0.011 to 1.17 with a mean of 0.222 and standard deviation of 0.262. Government loans was calculated as ratio of treasury bills to treasury bond. Between 2017 and 2021, government loans ranged from 0.039 to 26.876 with a mean of 4.232and standard deviation of 10.782. Mortgage loan was calculated this as ratio of residential loan to non-residential loan. Mortgage loan ranged from 0.042 to 25.22 with a mean of 2.238 and standard deviation of 4.670. Asset quality which is the dependent variable was determined using non-performing loans to total loans. From Table 4.1, observing overall statistics as obtained from panel data, between 2017 and 2021, asset quality ranged from 0.0174 to 0.570 with a mean of 0.158.
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Inferential Analysis

Hausman Test

The study determined whether to run a fixed effects model or a random effects model when conducting panel data analysis. The null hypothesis is that the preferred model is random effects; the alternate hypothesis is that the model is fixed effects. The p-value was considered significant at 5% and any value below that FEM was to be selected while a value above that then REM was to be selected. The results are indicated in Table 2.

Table 2: Hausman Test

	(b) Fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-V_B))S.E.
Commercial Loans	0.595471	0.507681	0.087791	0.073638

Personal Loans	0.170234	0.101301	0.068932	0.027911
Government Loans	0.702464	0.716053	-0.01359	0.015633
Mortgage Loans	1.735515	1.936437	-0.20092	0.104543

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test:Ho:difference in coefficients not systematic
$$\text{chi2(4)} = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$$
$$= \quad 12.95$$
$$\text{Prob>chi2} = \quad 0.0115$$

Results in the table 2 indicated a prob>chi2 value of 0.0115 which is less than critical P value at 0.05 level of significance which implies that the null hypothesis that a random effect model is the best was rejected. The study hence adopted a fixed effect regression model.

Regression Analysis
Regression analysis was used to check for the hypothesis concerning the connection of independent variables with dependent variable. The main aim of regression analysis is to show how and extent of which each variable separately influences the dependent variables. Regression analysis is used in estimating the weight of the influences of the independent variables in the dependent variable.

Model Summary
Model summary is used to show the percentage of dependent variable that can be explained by changes in the independent variable. The model summary was used to show the amount of changes in asset quality that can attributes to changes in Commercial loans, Personal loan, Mortgage loan and Government loans. In this regression, the four independent variables were entered as a block. Table 3 below shows the model summary of the adopted fixed effect model.

Table 3: Model Summary Fixed Effect of Loan portfolio on Asset quality

Fixed-effects (within) regression	Number of obs =	55
Group variable: FIRMID	Number of groups =	11
R-sq:	Obs per group:	
within = 0.8445	min =	5
between = 0.6727	avg =	5
overall = 0.8159	max =	5
	F(4,40)=	58.37
	Prob > F=	0.000

The analysis shows that the panels were strongly balanced for this multivariate analysis as shown by the number of observations per group. There were a total of 55 observations used in this analysis considering 11 groups of entities implying strongly balance panels. The minimum, maximum and average numbers of observations per groups were all equal to 5. The result obtained from fixed effect model indicated that the determinants accounted for 81.59% (Overall R square=0.8159) of the variation in asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya. The F-statistic to the model shows is 58.37 which is greater than 0 implying that the estimated parameters in the model are at least not equal to zero. This implies that four loan portfolio have an influence on asset quality of listed commercial banks at Nairobi Securities Exchange,

Regression Summary Coefficients
Regression coefficients are estimates of the unknown population parameters and describe the relationship between a predictor variable and the response. In linear regression, coefficients are the values that multiply the predictor values. P-values and coefficients in regression analysis work together to tell which relationships in the model are statistically significant and the nature of those relationships. The coefficients describe the mathematical relationship between each independent variable (loan portfolio) and the dependent variable (Asset quality). The p-values for the coefficients indicate whether these relationships are statistically significant. The results are presented in Table 4.

Table 4: Regression Coefficient

Asset Quality	Coef.	Std. Err.	T	P>t	[95% Conf. Interval]	
Commercial(X_1)	0.595471	0.169071	3.52	0.001	0.254507	0.936435
Personal(X_2)	0.170234	0.105103	1.62	0.113	-0.04173	0.382193

Government(X_3)	0.702464	0.098754	7.11	0.000	0.503307	0.901621
Mortgage(X_4)	1.735515	0.204195	8.5	0.000	1.323718	2.147312
_cons	-1.33172	0.244566	-5.45	0.000	-1.82493	-0.8385

The study regression model as obtained from table above is as shown below.

Asset quality (AQ) =-1.33172+0.595471(X_1) +0.170234(X_2) + 0.702464(X_3) +1.735515(X_4)

N/B: It is worthnoting that Personal loan   was not significant hence excluded from the main model. Thus the final model is

Asset quality (AQ) =-1.33172+0.595471X_1 + 0.702464X_2 +1.735515X_3

Where; X_1 Commercial loan; X_2 Government loan   and X_3 Mortgage loan

From the findings, commercial loans had a regression co-efficient (β_1) of 0.595471, p=0.001 implying that when personal loan, government loans and mortgage loan are controlled, a unit increase in commercial loans across time and among listed commercial banks at NSE would result in a significant increase of 0.595471 units in asset quality. Since the t value is greater than 1.96 and P value is less than 0.05, the first null hypothesis was rejected as commercial loans does significantly influence asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya.

Ngari (2021) indicated a positive and significant relationship between commercial loans and the asset quality of commercial banks. Sile, Olweny and Sakwa (2019) revealed that asset quality had a statistically significant relationship and is influenced by commercial loans. Izundu, Nwakoby and Adigwe (2017) found that asset allocation was a crucial financial management tool for raising banks' non-performing loans. Filipaki and Chrostos (2016) indicated that decline on asset quality was due to poor implementation and enforcement of commercial loan allocation, and this could encourage borrowers to cheat on the purpose of the loan, where payment and recovery could be an uphill task influencing poor asset quality of the commercial banks. However, Kakozi (2017) showed that there is no significant impact of banks specific variables and loan products on bank asset quality except for commercial loans

The study established that personal loan had a regression co-efficient (β_2) of 0.170234, p=0.113 implying that when government loans, commercial loans and mortgage loan are controlled, a unit increase in personal loan across time and among listed commercial banks at NSE in Kenya would result to insignificant increase of 0.1748 units in asset quality. The t value is less than 1.96 and P value is greater than 0.05, the second null hypothesis was not rejected as personal loan does not significantly influence asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya. From previous studies it has been confirmed that unsecured lending attracts higher rate of interest and hence Commercial Banks are eager to increase the volume of unsecured lending so as to gain from the higher rates of interest. However, default rate may affect the quality of their assets. This implies that those commercial banks that practice appropriate loan management practices expect significant influence and better results on their financial performance.

The results are in agreement with Abata (2018) who showed that there was enhanced reduction of the bad debt when the loans were secured with an asset unlike in the case where the loans were not secured. Rop, Muturi and Bokongo (2015) determined that there existed a substantial relationship between personal loan and asset quality of commercial banks in Kenya and hence the need of commercial banks to regularly finance asset growth to raise their performance and provide the enabling environment that will accelerate financial growth. Kariuki (2020) established that interest rates positively influenced the asset quality of the motor vehicle financing realized by the studied banks. However, the study findings are not in congruent with findings by Ayele (2012) that personal loans had an inverse correlation with ROE and a positive correlation with ROA. Owojori et al. (2010) displayed that the statistics acquired from liquidated banks in Nigeria clearly showed the major contributor to the financial crises of the liquidated banks was their inutility in the collection of personal loans and advances extended to customers.

From the findings, government loans had a regression co-efficient (β_3) of 0.702464, p=0.000 implying that when commercial loans, Personal loan and mortgage loan are controlled, a unit increase in government loans across time and among listed commercial banks at NSE in Kenya would result in a significant increase of 0.702464 units in asset quality. The t value is greater than 1.96 and P value is less than 0, therefore the third null hypothesis was rejected as government loans does significantly influence asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya. Being an alternative to credit for the application of excess liquidity in a banking sector where the volume of non-performing loans has increased, the banks' strategy of holding public debt securities seems adequate to gain profitability in the long run. Although with lower profitability, public debt securities are risk-free assets, hence involving fewer bank resources in their management enhancing their asset quality.

The results are supported Teixeira, Vieira and Ferreira (2021) found out that government bonds have positive impact on asset quality of commercial banks in Cape Verde. Beck and Smits (2018) argued that government loan by banks helps in achieving product diversification through provision of different and many products and therefore gave it a competitive advantage against its competitors. Sola et al., (2012) in their study found a positive linear relationship between government loan and loan performance derived from the fact that the benefits associated with government loan surpass the costs of government loan

However, Gerace and Smark (2018) found out that government loan whether related or not related adversely affected debt. The research established that strategy negatively influence on leverage. However, with transaction costs, companies don't alter their levels of debts automatically but use target adjustment model. Similarly, Maina (2017) indicated that the government loan had a negative effect on ROA indicator and ROE indicator were on a growth pace from 2012 to 2016. Mwangangi (2018) found an inverse, insignificant correlation between government loan and asset quality

Lastly, the results revealed that mortgage loan had a regression co-efficient (β_4) of 1.735515, p=0.000 implying that when commercial loans, Personal loan and government loans are controlled, a unit increase in mortgage loan across time and among listed commercial banks at NSE in Kenya would result in significant increase of 1.735515 units in asset quality. The t value is less than 1.96 and P value is less than 0, therefore the fourth null hypothesis was not rejected as mortgage loan does not significantly influence asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya. This study infers that commercial banks that offer real estate loans hold diversified portfolios of mortgage loans and therefore spreading risks in a manner that would be impossible if individuals were making real estate loans directly. Since commercial banks are large in size and number they gain in economies of scale. They are also more experienced in setting up, analyzing credit, loans, and making collections than individuals; hence reducing the processing costs of loans and subsequently increasing the availability of real estate loans.

The findings are in agreement with Andelinovic, Samodol and Pavkovic (2018) who revealed that revealed that loans in real assets had a positive and significant impact on the asset quality of Croatian commercial banks. Njiiri (2015) affirmed the existence of a positive and consequential relationship between real estate investments and the asset quality of financial firms. Kimeu (2015) evaluated the influence of real estate investment on the asset quality of investment businesses quoted at the NSE. The research established that real estate investment positively impacted on the companies' asset quality. Onchomba, Njeru and Memba (2018) established that mortgage loan influences the asset quality of commercial banks. The study findings are supported by the Utilization of modern portfolio theory. Koetter and Poghosyan (2018) found that banks asset quality distress is further affected by segmentation of the real estate market. However, Bhuyan et al. (2019) studied the effect of real estate investments as a portfolio diversification in commercial banks on asset quality. The research revealed that MREITs turn out to be the worst asset class to be used in portfolio diversification. The study recommended that small banks should not use MREITs for diversification. Similarly, Odhiambo (2015) concluded that mortgage loan does not influence the asset quality of listed commercial banks.
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V. Conclusion and Recommendation

In line with the first objective, influence of commercial loan on asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya the study concluded that commercial loan has significant positive effect on asset quality. An increase in commercial loan would results to significant increase in asset quality. Therefore, the study concluded that listed commercial banks are able to increase their asset quality when they offer more short-term loans to its clients. The second objective of the study was to establish the influence of personal loan on asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya. The study concluded that personal loan has insignificant positive influence on asset quality. An increase in personal loan would results to increase in asset quality. Therefore, personal loan is not a significant in determining asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya. The third objective of the study was to establish how government loans influences asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya. The study concluded that government loans have significant positive effect on asset quality. An increase in government loans would results to significant increase in asset quality. Therefore, government loan is a significant influencer of asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya. The study concluded that commercial banks are able to increase their asset quality when they offer more treasury bond as compared to treasury bills. The fourth objective of the study was to establish the influence of mortgage loan on asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya. The study concluded that mortgage loan has significant positive effect on asset quality as indicated by multiple linear regressions. An increase in mortgage loan would results to significant increase in asset quality. Hence, mortgage loan has significant predicator of asset quality of listed commercial banks at Nairobi Securities Exchange, Kenya.

The study recommended that commercial banks should prioritize short term loans over long terms loans. These loans are considered less risky compared to long term loans because of a shorter maturity date. The

borrower's ability to repay a loan is less likely to change significantly over a short frame of time. Further, they have high interest rates which enhance asset quality. The study recommends that management of listed commercial bank should always secure their loans and limit the amount of loans which are not secured. The study recommends that the commercial bank to be sure that the collateral undertaken is protected and will not deteriorate, this costs the bank money. The commercial banks should be sure that they have legal title to the collateral and are entitled to sell it in case of default. Policy makers could implement tighter restrictions on banks' ability to make new personal loans.The study recommended that listed commercial banks should invest more on treasury bonds since they can be traded on the secondary market, giving bond holders the opportunity to receive money for their security without rediscounting. Treasury bills, however, are not traded on the secondary market. The study also recommended that management of listed commercial banks should prioritize non-residential loan as compared to residential since their initial deposit is adequate with substantial interest rate. Further, high demand of commercial properties reduces tendencies on non-performing loans

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