REVENUE DIVERSIFICATION, TECHNICAL EFFICIENCY, SIZE AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

BY

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DECLARATION

Declaration by the Candidate

I hereby declare that this PhD thesis is my original work and has not been presented for a degree at any other University.

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DEDICATION

To my family;

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ABBREVIATIONS AND ACRONYMS

ADF : Augmented Dickey-Fuller

ANOVA : Analysis of Variance

CBK : Central Bank of Kenya

DEA : Data Envelopment Analysis

EBIT : Earnings before Interest and Tax

EU : European Union

FEM : Fixed Effect Model

GLS : Generalized Least Squares

HHI : Herfindahl-Hirschman Index

HHI_{II} : Herfindahl-Hirschman Index representing interest diversification

HHI_{NII} : Herfindahl-Hirschman index representing non-interest diversification

II : Interest Income

KBA : Kenya Bankers Association

LCC : Levin, Lin & Chu

NII : Non-Interest Income

REM : Random Effect Model

RoA : Return on Assets

RoE : Return on Equity

TA : Total Assets

TE : Technical Efficiency

USA : United States of America

VIF : Variance Inflation Factor

WB : World Bank

ABSTRACT

Banks interlink each other closely as well as financial market system players that make the sector systemic important to the larger economy. Therefore, the assessment of a banks' financial performance becomes a concern to the bank management, shareholders, market players, regulators and scholars. Commercial banks generate revenue mainly from traditional banking activities constrained by the related expense and the wider the interest spread the better financial performance. However, the banking sector across the world is sensitive to financial shocks and heavily regulated. This in effect destabilizes the banking revenue structure and in the end, weakens returns earned and capital base, with the net effect of limiting the banking funded activities. As a reaction, banks have drastically embraced diversification and ventured into non-traditional banking activities, aimed at complementing the dwindling traditional banking activities. Thus, it is of curiosity to know how such a paradigm shift in the banking business model affects the perceived profitability challenges in the sector. The objective of this study was to assess the relationships between revenue diversification, technical efficiency, size and financial performance of commercial banks in Kenya. Specifically, the study assessed the effect of revenue diversification on financial performance, the mediation effect of technical efficiency on the relationship between revenue diversification and financial performance, the moderation effect of size on the relationship between revenue diversification and financial performance, and the joint effect of revenue diversification, technical efficiency and size on financial performance. The study inclined towards positivism philosophical orientation and adopted a longitudinal descriptive research design. The resource-based theory guided the study and supported by the market-power and agency-problem theories. The study collected and utilized unbalanced panel data sourced from the central bank of Kenya database and across registered commercial banks spanning 2009 to 2018. The study used the Hirschman-Herfindahl index to generate revenue diversification levels while data envelopment analysis was used to generated technical efficiency indices. The study used a weighted composite index to capture size while the financial performance ratio was measured using profits before tax and exceptional items, over the total assets. The panel least square fixed-effect model evaluated the directions of the relationship between variables, while Baron and Kenny 1986's model assessed both the mediation and moderation effects. The results revealed that on average commercial banks were moderately diversified in revenue, and that financial performance related significantly with both interest($\bar{R}^2 = .37$, $\beta_1 = 6.27$, $p = .00$) and non-interest ($\bar{R}^2 = .36$, $\beta_1 = 5.16$, $p = .00$) diversification. Technical efficiency exhibited no mediation effect on the relationship between revenue diversification and financial performance while size moderated the relationship between non-interest (not interest) diversification and financial performance ($\beta_3 = -.68$, $p = .02$). Jointly revenue diversification, technical efficiency and size significantly affected financial performance ($\bar{R}^2 = .46$, $F (N (4, 416) = 8.52$, $p = .00)$). These results demonstrated that financial performances of commercial banks in Kenya improve with revenue diversification level and size size-dependent. The finding has important policy implication to scholars, policy-makers and bank manager in respect to the enactment of possible congruent policies that embraces banking activities mix in the intermediation process as well as optimal banking scope and scale targeted measures aimed at enhancing the financial performance of commercial banks in Kenya.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Commercial banks perceive revenue diversification as a possible financial performance stabilizing strategy. That is, because of financial deregulation, liberalization and the digital revolution world over, banks have expanded revenue nets to widen the interest margin spread, thereby strengthening financial performance indicators. Nevertheless, to benefit from the revenue diversification strategy, a commercial bank has to be technically efficient in the intermediation process. In other words, a bank has to generate the maximum possible output in terms of products/services from a given least input combination of borrowed funds or allocation. Seemingly, the technical efficiency level increase with the size of a bank, but beyond a certain point becomes inefficient due to the diseconomy of scale and scope. Further, banks are heterogeneous in size and thus enjoy benefits associated with economies of scope and scale differently. That is the size of a bank in terms of active assets, capital and reserve, deposits and other resource endowments, influences the diversification decision with the ultimate effect of enhancing financial performance indicators, as suggested by earlier studies that larger banks tend to be more profitable despite management complexity.

Word over, banks exist to intermediate between depositors and borrowers of funds and acts explicitly (or implicitly) as both services providers and financial intermediaries (Bikker, 2010). Mostly, inefficiency is an inherent feature in the banking business and in fact, the banking intermediation function emerged because of market imperfections (Goddard et al., 2008). Thus, commercial banks bring along with it a certain degree of

inefficiency in the intermediation process as well as the perfect competition outcomes. Financial intermediation entails deposits collection, loans underwriting, and making payments, which collectively constitute the traditional banking activities that generate interest revenues. The banking services provision involves the undertaking of administrative roles such as assets management, payments transmission, proprietary trading and other off-balance sheet activities, which collectively constitute the non-traditional banking activities that generate non-interest revenues (Stiroh, 2004). In this regard, commercial banks cab either generate revenues from both interest-bearing and non-interest-bearing activities complementarily (diversified) or concentrate (undiversified) on a single stream of revenues. Thus, the study assumed that commercial banks generated revenue from multiple sources, which in that case, introduced the concept of revenue diversification.

The intermediation process entails sourcing funds from various sources and transforming them into loans and investments (Coelli et al., 2005). In other words, commercial banks use inputs sourced as customers' deposits and shareholders' capital or other borrowed funds and employ labour in the form of skills and expertise to generate outputs in the form of loans and other investments. In such a case, if the value of loan/investment (output) falls below the values of the bank's borrowings (inputs) the bank becomes insolvent (Sharma, 2018). Such a scenario attracts an array of misfortunes including the loss of creditors' faith in the bank's ability to repay, customers' distress leading to the uncertain withdrawal of funds (or a run on the bank). Worse still, the regulator can take punitive action such as statutory management, receivership or liquidation of the bank ultimately. Thus, this brings the concept of

technical efficiency in the intermediation process, where a commercial bank has to be technically efficient in maximizing output from a given set of inputs.

The decision on a bank's size often intertwined with the diversification decision (Elsas et al., 2010). The size of a bank denotes the competitive market power and the ability to deploy owned idle resources profitably and as such, the bank size in terms of active assets, deposits, capital and reserve and other general resources endowment influences diversification decisions (Mulwa, 2020). Comparatively, larger firms tend to have a superior capital base, higher share of market activities, better bargaining power and efficient controls of operational cost (Golan et al., 2003). Put the concepts together, revenue diversified and technical efficient banks potentially generate higher revenue and subsequently pay higher returns on assets relative to smaller ones, and thus bigger banks become more profitable despite cost and management complexity.

However, the banking industry world over faces several interruptions occasioned by the banking activities restriction, market liberalization, technological changes and globalization of financial markets. These interludes accelerated by the borderless digital revolution, unbendable scrutiny by regulators as well as the political class, and by itself, sensitive to financial crisis inertia (Bikker, 2010). These interruptions more than often subvert the generation of interest revenue components for commercial banks, which over time, makes profits earning more difficult (Colangelo & Inklaar, 2010). In effect, these ultimately reduce the interest margin spread, which is a key pillar to the bank's returns on assets, with a ripple effect of weakening financial ratios, depleting capital base as well as limiting the banking funded activities. On this strength, banks in Kenya have seemingly embraced revenue diversification as a strategy to enhance financial

performance while conscious of technical efficiency and economies of scope/scale benefits as well as the management complexity.

Commercial banks play an essential role in the allocation of resources in the economy. In other words, banks allocate resources from depositors to investors continuously whilst generating the necessary income to cover the operational costs incurred. Therefore, for the sustainability of the intermediation function, banks have to be more technically efficient as well as profiteering from banking operations. Beyond the intermediation function, sustained financial performance has critical implications for the economic progress of a country (Bikker, 2010). That is, the sound financial performance earn rewards to the banks' shareholders, which in turn, inspire added savings and investments that catalyze the growth of the economy. In contrast, poor banking financial performance leads to banking failure or crises with a negative ripple effect on economic growth (DeYoung & Torna, 2013). Thus, the excess worth position ensures confidence from customers, creditors, regulators, and shareholders and allows a bank to operate as a going concern whilst maximizing financial returns ostensibly to satisfy the owners' wishes.

Candidly, banks have circumvented consolidation as a strategy to allow for a smooth diversification in revenue-bearing activities that generate non-interest revenues perceived as less regulated and stable relatively (Goddard et al., 2011). Consequently, both the industry players and regulators have pushed for banking business consolidation, perhaps the former aims at circumventing the barriers to new regulations and meeting the market demands as well as increasing the bank scope and scale. The latter's motive perhaps driven by the need for the sectors' stability and rescuing the

vulnerable and weak banks (Bikker, 2010). Accordingly, a bank's financial performance rests on a sustainable position where the worth of loans granted and investment activities must exceed the value of the funds borrowed.

Several theories explain why a firm might want to diversify into different business lines to improve financial performance. The most relevant theories that potentially linked the four formulated concepts include resource-based theory (Penrose, 1959), the market-power theory (Cowlings & Waterson, 1976) and the agency-problem theory (Ross, 1973). The resource-based theory assumes that firms are profit maximizers and uses owned, controlled, inimitable, and available resources to gain a competitive market through diversifying into related business activities that use existing resources (Alhassan & Tetteh, 2017). The resource-based theory advocates that it is through diversification that entities use the existing untapped resources with multiples uses, but constrained by market failures (Wan et al., 2011). Thus, the existence of untapped firms resources seemed to motivate banks to expand into other profitable business lines. Thus, the resources based theory puts more emphasis on the firm’s effectiveness in synchronization of resources to yield higher financial performance.

The market-power theory suggests that firms use diversification as a strategy to penetrate a new or existing profitable market (Cowlings & Waterson, 1976). The theory suggests that a firm can position itself using gains from another lucrative market to support policy in another new or existing market to increase its market share (Palich et al., 2000). Finally, the agency-problem theory suggests some logic as to why a firm manager pursues diversification as a strategy (Chen & Keung, 2018). The theory suggests that as firms expand in size, managers use diversification as a strategy to

deploy the firms' resources to profitable opportunities for self-enrichment as opposed to shareholders' wealth maximization (Jensen & Meckling, 1976). The theory emphasizes the conflicting views between firm managers and shareholders, which ultimately affect the firm's diversification decisions as well as financial performance.

In summary, the theoretical justifications on why firms diversify to enhance performance vary considerably. Both the resources-based and market-power are consistent with profit maximization, however, the former embraces the use of resources as a pre-requisite to diversification while the latter embraces the aftermath of diversification with a focus on the competition effect of diversification. Agency-problem theory dwells on managerial utility concerning conflicting interests and perceives diversification as an opportunity to self-enrich or if not to maximize shareholders wealth. Concisely, the market-power theory and agency-problem theories draw their relevance to the study concepts from resources view as an antecedence. Therefore, the theoretical arguments vary among the sampled theories, making it difficult to generalize on a single theory to interlink the four theoretical concepts. Nevertheless, resources based theory seemed potential and the current study strived to fill this theoretical research gap.

The ongoing tension in the literature reviewed on the benefits of revenue diversification to commercial banks motivated the current study. While it remained theoretical intuitive that diversification in revenue streams is beneficial to commercial banks, there is no shortage of empirical evidence to suggest that this may not necessarily be the case. The available empirical evidence on the relationships between revenue diversification and financial performance is inconsistent. This has been associated with the research

context and the period in which the conflicting studies were undertaken. Unlike in the context of developed markets, the developing economies appear to have weaker financial systems, intermediation inefficiencies and low adaptability to technology and innovations (Sanya & Wolfe 2011). Perhaps, most of the analysis and findings conducted were from developed economies and undertaken during the pre-internet era. Besides, some scholars have argued that banks in developing markets possibly need to widen in scale and scope due to inherent market failure (Khanna & Rivkin, 2001). Therefore, this raises a generalization concerns whether extrapolation of these findings into the context of the developing markets such as Kenya and the current internet intensive era would contextually be valid. Thus, the present study strived to address this contextual research gap.

The inconclusiveness, as well as contradictory findings from various studies on the relationship between revenue diversification and financial performance, has been attributed party to the research methodology adopted as well as varying measures of the variables. From the literature reviewed, there is no consensus on the best measures of variables and seemingly, the discord in the strand of research findings may be associated with the methodology, which includes data segmentation, endogeneity, sampling technique and the choice of the model used in data analysis. All these foster possible disparities in the findings (Tongli et al., 2005). For instance, scholars sometimes find nonsignificant, positive, negative and inverted U-shaped relationships despite using the same data (Wan et al., 2011). The measurement inconsistency exacerbates the findings divergence as reported in the empirical literature review. Thus, there is little understanding and no clarity as to whether the conceptualization, measurement and sampling techniques exacerbates the inconclusiveness of revenue

diversification relationship with financial performance in the context of the banking industry. The current study strived to address the disparity in the methodological knowledge gap.

Diversification in revenue appears a related type of diversification with a general theoretical perception that interest and non-interest component relates positively with each other. In such a case, it would be logical to presume that in the event of an economic shock, it would affect both the revenue streams in a similar way (Baele et al., 2007). This logic defeats the norm of using diversification to hedge against the effect of an adverse financial crisis wave shock. Thus, this perhaps raises curiosity on diversification as a strategy to reduce the impact of an adversarial financial trauma, given that the two streams move in the same direction. Further, the scarcity of studies and operationalization of variables that support technical efficiency in the intermediation process as well as the revenue generation process and the role of size in linking revenue diversification and financial performance of commercial banks inspired this study. Equally, it is hard to find a study that has evaluated the four highlighted concepts at the same time in any market, which reinforces the conceptual and contextual dilemma.

Therefore, the introduction of technical efficiency as a mediator and the bank size as the moderator contributes uniquely to a conceptual framework to enhance the understanding whilst unearthing the relationship puzzle between revenue components diversification and financial performance of commercial banks in Kenya's context. Therefore, this thesis provides both theoretical and empirical analysis aimed at assessing the relationship between revenue diversification, technical efficiency and size

effect on financial performance. The variables markedly interlink each other in the banking business and therefore, this study analysis fills the existing theoretical, conceptual, contextual and methodological research knowledge gaps.

1.1.1 Revenue Diversification

Banks earn revenue while undertaking the intermediation process. Revenue diversification refers to the practice of varying business activities that generate revenue and selecting that revenue source, which minimizes volatility (Yan, 2012). This study focused on revenue diversification as defined by Yan (2012), and thus views it as an expansion of banks interest-bearing activities to include non-interest-bearing activities. Put it in another way, revenue diversification is the creation of extra revenue lines via a new or existing business activity, which combined contributes to the rebalancing of the bank's revenue mix. In the banking context, revenue refers to the gross earnings or rather the sum of interest incomes, fees and commission, and trading incomes (DeYoung & Torna, 2013).

A bank's core product is money, which implies that commercial banks turnover measures does not exist at all. In a broader sense, revenue depicts what customers pay for a provision of services or financial products, and a bank can inflate its revenues by engaging in non-banking activities. A bank that holds larger stakes in non-banking financial subsidiaries books higher revenues without significant effect on the balance sheet totals and other similar parameters. Further, banks decompose revenue sources into interest income components and noninterest income components — alternatively, fund-based income and fee-based income. The origin of income not falling into any of the classifications such as interest income from deposits held in a central bank, tax

refunds, gains made on the sale of assets, provisions written-back and miscellaneous revenues constitute other incomes.

In the world of a frequent financial crisis, banks need to be diverse from each other to respond differently to different financial inertia. For example, if banks pursue similar business lines, the exposure to a given catastrophic event affects them simultaneously, which becomes a concern for the regulators about sectors stability. The problem exacerbates when several small banks operate in a similar business line, which exposes equally to the same financial shocks (DeYoung & Torna, 2013). Therefore, the consequence of revenue diversification on financial performance of commercial banks is unclear. For instance, an increase in diversification levels potentially improves earnings; however, such an increase seldom occurs without concomitant changes in variable inputs, fixed inputs and financing structure of a bank (Stiroh, 2004). Moreover, the banks' expansion into non-interest activities components such as fee-based products and services, reduce earnings volatility via diversification effect and besides, banks believe to be convenient relatively to interest activities.

Several studies unearthed divergently reasons why banks pursue diversification. For example to increase intermediation efficiency and resource utilization (Alhassan & Tetteh, 2017), managerial self-entrenchment (Chen & Keung, 2018), market power (Ovi et al., 2014), and enhanced financial performance (Sanya & Wolfe, 2011). Banks perceive revenue diversification as a possible solution to financial performance concerns because a given adversarial financial-economic shock cannot affect multiple revenue sources similarly so long as they do not relate positively to each other (Lepetit et al., 2008). In essence, diversification lowers the overall bank risk as banks cross-sell

products and services as a bundle while using information gained during the loan appraisal process to assess customers' risk profile to revitalizing the provision of non-interest products (Sanya & Wolfe, 2011). Therefore, in the context of the current study, revenue diversification has the effect of lowering cyclical variation in profits, thereby used to hedge against insolvency, liquidity problems and inefficiencies.

Literature reviews revealed disparities in indices measurements for diversification. These include the Herfindahl-Hirschman Index, Berry-Jacquemin Entropy (1979) Entropy Index, Berry-Herfindahl (1971) Index, and Rumelt (1974) Index. The Berry-Jacquemin entropy is suitable for continuous variables and requires sales data, which is practically inapplicable in the banking business. Berry-Herfindahl index is a non-continuous measure based on an equal size segment while Rumelt's classification measure is subjective, which then compromises reliability (Sambharya, 2000). Based on the weakness of each index, the study adopted the Herfindahl-Hirschman Index (HHI). The index is a weighted composite index introduced by Hirschman (1945) and Herfindahl (195) independently as measures of concentration. It is a sum-up of weighted squared exposure as a percentage of total exposure and ranges from zero to a unit ($0 < HHI < 1$). A higher level of the index reflects concentration while a lower value reflects diversification. For ease of understanding and interpretation of the results, this study used a reversed index (1-HHI), so that the higher the index levels increases with the level of diversification (Gambacorta et al., 2014; and Sanya & Wolfe, 2011).

Based on theoretical and empirical perspectives, the study expected the revenue diversification index to relate positively to the financial performance of commercial banks. This is because interest-bearing and non-interest-bearing activities complement

each other that spread the risks associated with the traditional activities, which in essence, reduce revenue variation as well as banks' profits (Stiroh, 2004). Further, revenue diversification allows banks to exploit profitable and related opportunities that use similar resources and distribution of fixed cost across activities, which then pushes down expenses as well as utilizing the idle capacity to generate additional revenue lines. This smoothens and generates superior returns compared to inflexible specialized banks. Therefore, more revenue generated implies a higher interest spread margin, which ultimately enhances financial performance.

1.1.2 Technical Efficiency

Technical efficiency refers to the firm's ability to generate a possible optimum set of output using a minimum set of inputs (Koopmans, 1951). A decision-making unit achieves the technical efficiency status only if it is impossible to improve any input or output without worsening the other inputs or outputs (Farrell, 1957). Thus, the point to which the real amount produced approaches its maximum is termed the technical efficiency (Fare & Lovell, 1978). In the production frontier, profit maximization requires that an entity output production is at maximum given inputs (Herrero & Pascoe, 2002). In the context of banking, technical efficiency refers to the ability of a bank to intermediate the maximum possible output from a given bundle of inputs with a given level of technology. Thus, a technically efficient bank generates the maximum possible banking products and services from the least inputs combination it holds relative to other banks. Alternatively, technically inefficient uses the input combination such as borrowed funds and labour above the necessary relative to other banks to generate a given amount of outputs.

This study modelled technical efficiency as a mediator variable. A mediator is a third variable that transmits the effect of the exogenous (independent) variable to the endogenous (dependent) variable. Therefore, a mediation analysis helps to unearth how an observed relationship exists between the main variable and perhaps illuminates the mechanisms through which the variables could relate and could unearth the inconsistency in such relationships. In the context of this study, the concept of technical efficiency becomes important in setting both banking and regulator's programs to allocate funds to a more productive economic zone, which in effect, improves the intermediation process and in the interlinkage to the larger economy (Coelli et al., 2005). That is, efficiency creates a necessary productive atmosphere that catalyzes economic growth through channelling funds into a deficit sector of the economy. However, a technically efficient bank does not exist in an ideal situation but estimated from an observed sample which implies that technical efficiency is a relative term. In the context of banking, the intermediation process entails the collection of deposits and capital and using labour to transform them into loans and investments.

Broadly, there are two frontiers for modelling technical efficiency: parametric and non-parametric (Coelli et al., 2005). Parametric frontier is an econometric model, which requires pre-defined functional forms such as production, cost and revenue functions. It allows for the effect of random error in the model, in which case, leads to subjectivity in the results. Based on the aforementioned parametric model weakness, this study adopted the non-parametric frontier to measure technical efficiency. Charnes, Cooper and Rhodes (1978) introduced data envelopment analysis (DEA) as a build on Farrell (1957)'s single input-output measure to multiple inputs-outputs measures.

DEA identifies decision-making units with the best production practice using an identical inputs matrix to generate optimum outputs matrix. DEA does not require a pre-defined functional form, which makes it less prone to model misspecification, and thus, not subjectable to underlying distribution assumptions about the error term (Sharma, 2018). DEA models data points such that all the observed points lie on or below the production possibility frontier. In such a case, a technically efficient bank could achieve a maximum value of a unit theta ($\theta = 1$) in comparison to a less unit theta ($\theta < 1$) for an inefficient bank relatively. This implies that an inefficient bank needs a unit less theta ($1-\theta$) reduction in the inputs levels to reach the frontier or a unit less theta ($1-\theta$) increase in output level to reach the frontier (Sharma, 2018).

This study expected technical efficiency to mediate fully or partially the relationship between revenue diversification and financial performance. Banks intermediate efficiently by taking relatively cheap resources from the supply-side as inputs and create attractive output on the demand-side (Bikker, 2010). That is a technically efficient bank in the intermediation process could benefit from the diversification by generating maximum possible output in terms of banking products and services offered from the least input combination of deposits, capital and reserves and other borrowed funds allocation. Thus, in aligning to the concept of resources flow, banks take action programs by engaging efficiency in various banking and non-banking activities to generate multiple revenues as a strategic decision and by being technically efficient in the intermediation process. In such as case, the effect of revenue diversification could be transmitted through technical efficiency to enhance banks financial performance in support of the perceived conceptual theory.

1.1.3 Bank Size

Bank size refers to some unique characteristics and capabilities possessed and controlled by a bank for its active operations and in which case, can easily avail to its customers (Golan et al., 2003). Banks differ markedly from each other and across various traits of banking business models. That is in terms of the span of services and products offered, amount of assets it holds and liabilities, funding sources and capital endowment, the size of balance sheet and off-balance sheet items, and the risk appetite among others. In the end, these characteristics considerably affect the bank's revenue structure, market activities, management complexity and profitability status (Anolli et al., 2015). For instance, a small bank can benefit from being more responsive in the management model while large banks can face challenges associated with diseconomies of scope and scale as well as management complexities.

This study introduced bank size as a moderator variable. A moderator is a third variable that affects the zero-order correlation and often assessed in a case where a relationship between the independent and dependent is unexpectedly weak/strong or otherwise inconsistent (Hayes, 2015). In other words, the interaction between the predictor and the moderator could alter the existing relationship between predictor and predicted by enhancing, such that increasing the moderator increases the effect of the predictor on the predicted; buffering, such that increasing the moderator decreases the effect of the predictor on the predicted; and antagonizing, such that increasing the moderator reverses the effect of the predictor on the predicted (Baron & Kenny, 1986). The concept of bank size became essential because it enables banks to diversify risks with enhanced managerial competence whilst gaining other benefits associated with

economies of scale and scope (Olweny & Shipho, 2011). That is, a forward-looking bank attempts to increase its capacity through consolidation—mergers and acquisitions—to gain a competitive edge over the competition by leveraging on average cost reduction per unit to enhance profitability indicators.

Measuring bank size is far from being straightforward since banking entails intermediation business, and thus, it is unclear what banks in reality produce. The literature reviewed reveals three different size perspectives; market-based indicators; accounting-based indicators; and regulation-based indicators (Simiyu, 2016). The market-based activities capture the bank's scope and scale of involvement in the market activities while the accounting-based indicators reveal the strengths of a bank's capital structure and the regulator's indicators show the bank's extent of reliance on collected deposits and other funds (Foos et al., 2010). The widely used firm size indicator is total assets, which represents a single balance sheet item and does not account for the type of assets owned by a bank, and further does not explain the funding source of an asset or how such funds accumulates (Anolli et al., 2015). Further, it does not reflect the activities in which a bank engages, for instance, some banks make loans using deposits and hold loan balance while other offer wholesale funding, securities market-mark and hedging in derivatives. Thus, the robust and better measure of bank size is a composite index to address the shortfalls associated with using a single scale indicator.

This study adopted the regulator's size assessment model based on a weighted composite index of assets, liabilities and shareholders' funds. Bank's assets include real cash, balances held at CBK, placement with other institutions, government securities, investments, loans etc. while liabilities and shareholders' funds comprise customers'

deposits, and capital and reserve (CBK, 2018). Based on the regulator's composite index that CBK classify banks into three peer groups: the large, medium and small banks. The index assigns equal weights of thirty-three percent (33%) to each of the banks' net assets, capital and reserves, and customer deposits, which sums up to ninety-nine percent (99%), and an equal distribution of the remaining one percent (1%) over the number of deposit and loan accounts (Al-Arif & Aw-waliyah, 2018; Laeven et al., 2016; and Evgeni, 2012).

This study expected bank size to moderate the relationship between revenue diversification and financial performance via economies of scope and scale. That is, larger and better-capitalized banks could raise funds more easily and likewise lends more efficiently. Ultimately, when the financial performance of a larger bank compared with that of a smaller bank, the former tends to outperform the latter because of a larger market share attributable to better decision-making, and the abundance of resources in terms of capital, skills and technological advancement (Boateng et al., 2013). Further, the domineering bargaining power and supra financial position along with beefed efficiency in operations and fixed cost controls make larger banks outperform the smaller banks. A bank with more resources could diversify into different banking activities, which generate multiple revenues to enhance financial performance.

1.1.4 Financial Performance

Financial performance refers to a constructed measure represented by profitability, growth and market value (Cho & Pucik, 2005). Financial performance refers to a replication process, where a firm uses its resources to achieve its set objectives as expressed in the form of profitability (Rozzani & Rahman, 2013). Olusegun et al.

(2013) defined financial performance as operational management of profits, earnings-per-share, assets-quality, capital adequacy and liquidity. This study adopted financial performance in terms of profitability as defined by Rozzani and Rahman (2013). In other words, an indicator shows the overall well-being of an entity in utilizing its active business assets to generate revenue and shows the overall position over a given period.

Financial performance remains a fulcrum point of interest for bank customers and managers, regulators and other stakeholders and as such, the profitability index features the strength to produce satisfactory results. The key objective of most banks is to maximize profits and shareholders value. That is, profitable banks could retain a higher proportion of earnings to increase their core capital, offer higher returns to shareholders, and able to raise capital and other funds more easily from markets (Flannery & Kasturi, 2008). Financial performance ratios show how best a bank uses its invested funds in generating returns and remains a key business concern of every market leader, customer or owner, and further assists management in the formation of sound operating and financial policies (Almazari, 2014). Banks largely depend on the strategic fit of their characteristics and objectives, along with how relatively efficient a bank is in transforming assets as demarcated by the resource-based theory (Terziovski & Samson, 2000). Thus, the capacity to generate sustainable financial performance over time is the bank's first line of defence as it absorbs unexpected losses, strengthens the bank's capital base and improves future performance through re-investment of retained earnings. In contrast, a loss-making bank depletes its capital base and as such, weakens financial performance, which in turn, puts equity and debt holders at risk.

In the banking context, financial performance can be measured using three approaches: the traditional, the economic added, and the market-based models (Cho & Pucik, 2005). The traditional method includes returns on assets (RoA), returns on equity (RoE), returns on capital employed and interest margin. The economic added approach is a measure of the opportunity cost of shareholder holdings and includes economic value-added and the weighted average cost of capital. However, the market-based indicators could limit the population of the study to few banks listed in the exchange market. These include total share returns, price-earnings ratio, price-to-book, and credit default swaps (Bikker, 2010). In considering the characteristic of the study population, the traditional approach seemed more appropriate, and as such, this study adopted the traditional approach to address the challenges associated with both markets based and economic added approaches. Under the traditional approach, RoA and RoE are the most used indicators to measure financial performance. However, RoE is a short-term internal financial performance measure, implying a manipulatable indicator that depends on the availed managerial incentive. Further, RoE fails to discriminate between the best and poor performance and insensitive to risk given the component of financial leverage, which inflates with changes in either equity or assets.

Therefore based on the weakness associated with RoE, this study focused on RoA, a widely used traditional indicator for measuring financial performance in banks. The index perhaps satisfies almost all stakeholders of funds such as shareholders, debtors, creditors, debenture, bondholders, etc. This satisfaction feature makes RoA broader and useful compared to RoE, which measures returns only from the shareholders' perspective (Olusegun et al., 2013). RoA is a function of RoE in DuPont analysis (product of profit margin and asset turnover), which makes it a more specific measure

of financial performance (Terziovski & Samson, 2000). RoA conveys how well a bank uses owned resources to generate maximized revenue and considered a more reliable profitability indicator since it can be adjusted for the leverage effect (RoA = RoE/leverage (debt/capital). For instance, banks with higher RoA are resilient amid a financial crisis. Likewise, the RoA for investment-driven banks contributes positively to the increase in RoE. Thus, when RoA is favourable to the bank, it contributes positively to the increase in RoE. Studies have shown that banks with higher RoA prove more resilient amid a financial crisis, especially investment-driven banks.

The study measured RoA using earnings before tax and exceptional items, over the total assets to allow comparability of profitability index across all banks. In essence, commercial banks have many assets, which make them highly leveraged. The implication is that banks' returns on assets become low generally and usually, affected directly by the sector's endogenous and exogenous factors. Several studies have adopted RoA as a financial performance indicator (Almazari, 2014; Olusegun et al., 2013; Rozzani & Rahman, 2013; and Bikker, 2010). Based on the literature reviews, this study expected returns on assets to relate positively with revenue diversification, technical efficiency and bank size. That is because a bank with idle resources quests for diversification to put unemployed resources into a profitable venture. Thus, this expands the bank size both vertical and horizontally, hence increasing in size and management complexity associated with diseconomies of scale and scope. Then the question of efficiency in the intermediation process sets in, and as such, a bank needs to beef its operational challenges to produce loans and other investments efficiently to enhance profitability. Thus, the profitability index, RoA offers clues about the ability of the bank to undertake risks and expand its activity.

1.1.5 Commercial Banks in Kenya

The banking sector in Kenya comprises the Central Bank of Kenya (CBK) as the regulator, commercial banks, deposit-taking micro-finance, foreign exchange bureaus and a mortgage finance company as regulated (CBK, 2018). Several pieces of legislation guide the CBK mandate among these are the Constitution of Kenya 2010, the Central Bank of Kenya Act (2015), the Banking Act (2015), the Microfinance Act (2006), the Kenya Deposit Insurance Act (2012), the Companies Act (2015), the national payment system Act (2011), etc. These mandates CBK to license, regulate, supervise, suspend or liquidate a commercial bank. The Kenya Bankers Association (KBA) is the umbrella body formed and used by commercial banks to address any pertinent issues affecting the banking sector. As of 31 December 2018, there were 43 commercial banks, three credit bureaus, eight non-operating banks holdings companies, nine representatives' offices of foreign banks, 13 micro-finance banks, 19 money remittance providers, and 70 foreign exchange bureaus. CBK classifies banks according to size in terms of bank assets held and liabilities obligations and as such, there were eight large banks, 11 medium banks and 21 small banks (CBK, 2018). Commercial banks in Kenya are heterogeneous in terms of scope and scale of market share and activities, sources of funds, management style and costs controls, and the technological advancement level and clientele. Nevertheless, Kenyan banks are homogeneous in terms of financial products and services offered.

The sector is transitioning to a more disciplined and efficient one, as evidenced by several reforms initiated by CBK to strengthen financial performance. These reforms include the issuance of prudent guidelines, changes in the CBK Act, changes in the

Banking Act, and the stringent adherence to the minimum core capital requirement of Kenya shillings one billion. These reforms have altered the form and structure of the banks' revenue-bearing activities, capital and reserve, market structure, asset base and the operational domain of commercial banks in Kenya. Coupled with the drying up of low-cost funds and stiff competition from banks and non-banks, fintechs and bigtechs, the demand for resources has intensified and has forced banks to enter into short-term lending. The phenomena have elevated pressure for deposits and other funds, existing and potential customers, investors, financial innovations, and new products and services that provide various fee-based services (KBA, 2018).

Kenya's banking sector landscape has changed drastically and to survive, a commercial bank has to introduce new products/services or expand existing ones continuously. Thus, the capacity to generate sustainable financial performance over time is the first line of defence for a bank against unexpected losses. It strengthens the capital base, expands funded activities and improves future financial performance through re-investment of retained earnings. A loss-making bank on the other hand depletes its capital base as a loss absorbent and shrinks funded activities, which puts equity and debt holders at risk (Colangelo & Inklaar, 2010). For a commercial bank to achieve stability in financial performance, it has to sustain revenue generation over time, perhaps through revenue diversification while adding new delivery channels in response to the dynamic consumer needs, products innovations, technology advancements and the use of multiple delivery channels such as electronic banking and mobile banking.

The unfavourable banking indicator and setbacks of 2015/16 propelled the regulator to tighten banking regulations aimed at strengthening the strong banks and encouraging consolidation among weaker lenders to crystallize into a smaller number of bigger banks with a stronger quality profile and resilient going forward (KBA, 2019). The implementation forced banks to shift business focus to non-interest income, which seems to affirm diversification through various alternative transactional channels such as mobile, internet and agency banking. Seemingly, Kenyan banks are overzealously consolidating their services to form a financial supermarket, perhaps to increase the revenue base and as such, the benefits of such paradigm shift remain a puzzle that this study would unravel.

The banking sector in Kenya has witnessed consolidations and massive adoption of emerging technologies such as blockchain and fintech to heighten customers' experience transformation (Cytonn Investments Limited, 2017). Given the ongoing digital revolution, innovation and cost rationalization measures, banks expected to be technically efficient in the intermediation process given the ease of performing banking activities. This metamorphosis has the effect of increasing the bank size while reducing the number of small players in the sector. On perusal of banks' financial statements, there is an exciting arrangement of revenue-generating activities. Banks perceive revenue diversification as a possible solution to the problems related to financial performance. Banks' income statements seem to attest to this argument with activities moving gradually from interest-bearing activities to non-interest-bearing activities.

Nevertheless, the sector recorded a decline in profits by 9.6 percent in 2016, attributable to the suppressed interest income margin associated with the implementation of the

interest capping law in 2016, but surprisingly registered improved financial strengths as evidenced by an increase in total net assets between 2016 and 2018. This attests to the belief that profitability pressure would persist for Kenyan banks because of depressed interest rates and significant capital outlays on technology investments and higher regulatory requirements. Therefore, the consequence of revenue diversification on financial performance of commercial banks is unclear. For instance, an increase in diversification levels potentially improves earnings; however, such an increase seldom occurs without concomitant changes in variable inputs, fixed inputs and financing structure of a bank (Stiroh, 2004). Moreover, the banks' expansion into non-interest activities components such as fee-based products and services, reduce earnings volatility via diversification effect and besides, banks believe to be convenient relatively to interest activities. Whether the level of technical efficiency and bank size have any effect on the relationships between diversification and financial performance in Kenya's context remains a puzzle and intellectually appealing that the study intended to address.

1.2 Research Problem

World over, the banking sector faces many challenges as well as business model interruption attributable to the digital banking revolution, tighter regulation, high capital requirements, and competition from within and fintech that have made earning profits so tricky. In the era of the borderless digital world, where persons interact freely with each other and able to use the social platform to make payments with faster delivery and inexpensive alternatives to the traditional banking system. Further, the sustainability of profitability indices has attracted the attention of stakeholders,

especially the regulators because the earnings are a pointer to the bank's asset quality. For instance, a bank with persistently high levels of profitability indicators signals an excessive risk-taking, and a buildup of vulnerabilities, which eventually jeopardizes sustainable profitability. Thus, the engagement of banks in multiple revenue-bearing activities to stabilize profits becomes a relevant issue in the respect of this study.

In theory, diversification should lead to the reduced volatility of earnings, however, earnings arising from interest-bearing activities seem much less volatile than non-interest-bearing activities – a large part of these gains is non-recurring (trading income, non-retail fee income). It is unclear as to whether the over-the-cycle profits of these non-recurring activities are sufficient to make up for the increased volatility. The theoretical justifications on why firms diversify to enhance performance vary considerably. Both the resources-based and market-power are consistent with profit maximization, however, the former embraces the use of resources as a pre-requisite to diversification while the latter embraces the aftermath of diversification with a focus on the competition effect of diversification. Agency-problem theory dwells on managerial utility concerning conflicting interests and perceives diversification as an opportunity to self-enrich or if not to maximize shareholders wealth. Concisely, the market-power theory and agency-problem theories draw their relevance to the study concepts from resources view as an antecedence. Therefore, the theoretical arguments vary among the sampled theories, making it difficult to generalize on a single theory to interlink the four theoretical concepts. Nevertheless, resources based theory seemed potential and this study strived to fill this theoretical research gap.

The empirical evidence on revenue diversification and financial performance across the world has been inconsistent. Equally, it has been hard to find any study that has associated the increase in non-interest income with the reduction of revenue volatility (Baele et al., 2007). During financial distress or a tighter interest regulatory regime as witnessed in the current case of Kenya, interest income declines along with a possible decline in non-interest income, if the two income streams are positively related (Ahuja & Novelli, 2017). From the preceding, a dilemma persists as to whether revenue diversification improves or discount financial performance. The study sought to ascertain this relationship by introducing technical efficiency and size as mediating and moderating variables respectively. Perhaps these variables enhance the understanding of the concepts, which to this end, has been hard to find a study that provided a clear understanding. Revenue diversification, technical efficiency, bank's size and financial performance are remarkably interlinking concepts in the financial intermediation process and assets transformation. Thus, this argument highlights a conceptual research gap that this study sought to unravel.

Several studies have assessed the relationship between financial performance and revenue diversification in different economies globally; however, the empirical findings conflicted with each other. The startling academic curiosity is that the developed economies' findings similarly contrasted each other. For example, some studies argued that diversification enhanced financial performance (Githaiga et al., 2019; Kumar et al., 2019; Mundi, 2019; Ndungu & Muturi, 2019; Cetin, 2018; Nisar et al., 2018; Belguith & Bellouma, 2017; Guerry & Wallmeier, 2017; Natalia et al., 2016; and Brighi & Venturelli, 2015). On the contrary, other studies suggested that diversification weakened financial performance (Tran et al., 2020); Nguyen, 2019;

Gupta & Sen, 2016; Saunders et al., 2014; Mulwa & Kosgei, 2016; and DeYoung & Torna, 2013). Besides, some scholars have argued that banks in developing markets possibly need to widen in scope due to inherent market failure (Khanna & Rivkin, 2001). These conflicting literature findings perhaps associated with the developed market context and the era in which such conflicting studies were carried for instance a pre-internet age or non-technological intensive. Thus, extrapolating such inconsistencies to the current era of internet intensive, product innovation, mobile and agency banking and in the context of developing economies may not be valid contextually. Therefore, this study attempted to fill the contextual research gap.

Several studies have used econometric methodologies such as a cross-sectional estimator, which may not allow for endogeneity control and as such, most research works reported negative results. However, Sanya and Wolfe (2011) suggested that controlling for the endogeneity, the negativity in some of the relationships reduces and sometimes the relationship changes to positive. Therefore, there is no consensus in the literature reviewed so far on the best measure of variables. Seemingly, the discord in research findings may be associated with the data segmentation, endogeneity, sampling technique and data analysis techniques. All these may foster disparity in the findings (Tongli et al., 2005). From the preceding arguments, the current study used panel least square fixed-effect to analyze the relationships between the variables in an attempt to address this methodological research gap.

Kenyan commercial banks perceive revenue diversification as a possible solution to the problems related to financial performance. Whether technical efficiency and size have any effect on the relationships between diversification and financial performance in

Kenya's context remains a puzzle and intellectually appealing. Thus, the need to undertake the current study to demystify the mystery and address the knowledge gap. The research question was; what would be the relationship between revenue diversification, technical efficiency, size and financial performance of commercial banks in Kenya?

1.3 Research Objective

The main objective of this study was to assess the relationships between revenue diversification, technical efficiency, size and financial performance of commercial banks in Kenya. The specific objectives were to:

i. Assess the direct effect of revenue diversification on financial performance of commercial banks in Kenya.
ii. Assess the mediation effect of technical efficiency on the relationship between revenue diversification and financial performance of commercial banks in Kenya.
iii. Evaluate the moderation effect of size on the relationship between revenue diversification and financial performance of commercial banks in Kenya.
iv. Evaluate the joint effect of revenue diversification, technical efficiency and size on financial performance of commercial banks in Kenya.

1.4 Value of the Study

The finding of this study adds value to the theory building in the field of finance and extends the theoretical knowledge frontier in revenue diversification and financial performance relationships. It provides an evidence-based integrated conceptual

framework linking the identified concepts together and provides an understanding of the inter-relationships. Further, the study documents the resource-based theory and supported by market power and agency theories as to the most relevant theories that link banks resources with the revenue diversification strategy to generate superior financial performance. This study therefore, attempted to unearth the inconsistency of findings from previous findings on revenue diversification and financial performance relationship puzzle, while appealing to the scholars by way of future research.

The policymakers in the banking sector appreciate the contribution of this study in providing a scale of opportunities to understand the issues and constraints that affect the banking sector's financial performance. It would assist in prioritizing the banks' activity mix using new policies as a guide. The study focused on revenue diversification as a strategy to enhance the soundness and stability of the banking and provided a platform for the regulators to develop a guideline for implementation by commercial banks to avoid unnecessary bank runs and unwarranted receivership/liquidation or management of commercial banks. Further, governing ingenuities would respond to the findings in the way of protecting the banking systems, particularly during financial distress. The banking practitioners need accurate information about the effects of their actions on banks' financial performance given their role as economic growth as drivers and the need to maximize shareholders' value. The banking managers would find the findings useful in identifying better business models to improve financial records and design remedial schemes or programs to support banks operations. Further, the study findings would guide the entrepreneurs to diversify more and adopt a productive revenue stream, which maintains banks' financial stability over time as a going concern.

1.5 Organization of the Thesis

This thesis presents six chapters. Chapter one introduces the concepts of the study, namely revenue diversification, technical efficiency, size and financial performance in the context of commercial banks in Kenya. Closely, followed by the research problem, objective and the value of the study. Chapter two presents the theoretical foundation and empirical literature underpinning the study. Theories include the resource-based theory, market-power theory and agency problem theory while empirical studies include revenue diversification, technical efficiency, size and financial performance. The chapter ends with a summary table of the knowledge gap, conceptual framework, conceptual model and hypotheses guiding the study. Chapter three presents the research methodology starting with research philosophy, research design, population of the study, panel data collection and various panel data diagnostic tests, operationalization and measurement of the variables, data analysis and analytical models. Chapter four presents the preliminary results on data capture rate, trend analysis, descriptive statistics results, diagnostic tests and correlation analysis. Chapter five presents the hypotheses tests result of the four assumptions as well as the discussion of the research findings. Chapter six focuses on the summary of findings, conclusions and contributions to knowledge, policy, practice and theory. The chapter concludes with the limitations of the study and suggestions for further research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents the theoretical foundation underpinning the study, the empirical literature review, the summary of the knowledge gap and concludes with the conceptual framework and hypotheses.

2.2 Theoretical Foundation

This section presents the theoretical framework of the most relevant theories that explain the central relationships between revenue diversification and financial performance. Among the most relevant theories are the resource-based theory (Penrose, 1959), market-power theory (Cowlings & Waterson, 1976), and agency problem theory (Ross, 1973). This study evaluated whether these theories could hold in model prediction with the introduction of technical efficiency as a mediating variable and size as a moderating variable.

2.2.1 Resource-Based Theory

Resource-Based Theory (RBT) origin is traced to Penrose (1959) seminal work as a firm's growth theory, and Wernerfelt (1984) built on later as a performance theory. The resource-based approach highlights the linkage between resources, sustained competitive advantage and superior financial performance. Other authors have followed the suit and enhanced the theory in scope that is, from just the physical resources to include intangible resources such as skills, knowledge and services (Teece, 1982; and Rumelt & Lippman, 1982). Ligang, Vedastus and Yang (2011) used

resources based theory to gauge the performance of 15 commercial banks in Tanzanian. The study used unbalanced data set for the period spanning 2005 to 2009. The study found that banks resources capabilities greatly influence banks performance. According to Wan, Hoskisson, Short and Yiu (2011), the resource-based view advocates that through diversification that entities could profiteer from idle or untapped resources that have multiples uses but constrained by market failure. Thus, the existence of idle resources seems to motivate banks to expand into other non-banking business lines.

The resource-based theory has since dominated as a theory to explain the inter-firm performance differences (Ligang et al., 2011). The theory argues that superior performance emanates from resources deployment and therefore, resources-based-view theory perceives a firm as a basket of productive resources —both tangible and intangible—and defines a resource as anything useful that an entity uses to execute its performance strategies (Kraaijenbrink et al., 2010). The theory acknowledges that a firm possesses some specific and unique heterogeneous resources that propel growth as opposed to the market and the industry-specific factors. It builds a strong background that justifies an entity's existence from a resource perspective and links to products and market activities. The theory assumes that extra resources motivate a firm to expand into different profitable businesses, which use similar resources. It emphasis diversification as a reaction to the excess under-utilized production capacity and perceives a firm as a bundle of hard and soft support used to gain competitive advantage.

RBT conscripts some statuses under which, an entity's endowed resources become a prime sustainer of high returns over time. Among these is the entry to the market

barriers, enjoying the protection of a resource position as a barrier and charging lower costs of services while maximizing revenues (Alhassan & Tetteh, 2017). This logic extends to the allocation and sharing of fixed costs, competencies, technologies, etc. across many business lines. Thus, diversification based on resources enhances performance by either cost reduction or playing competitors out of the market as the absolute volume-per-period increases (Gujarati & Porter, 2009). Furthermore, the theory suggested that resources induce growth if there appears a better and new use of unemployed resources and thus, demonstrates how resource utilization attains higher financial performance (Greene et al., 2015). Therefore, this theory explains why a firm could diversify into related activities lines, which use similar resources to generate higher returns relative to other firms.

Previously, several studies have attempted to unearth the superb effect of resources on financial performance. In assessing the relationship between economic performance and the support of profitable banks globally. Clulow, Gerstman and Barry (2003) found that resource availability and deployment strategies enhanced productivity and generated superior financial performance over time. The findings were consistent with a study's findings by Mehra (1996) on the determinants of economic performance, which found a strong positive association between banks' resource endowment and performance. Barney and Peteraf (2003) described resources based theory as an unwavering theory of premium firm performance and that if the assumption of heterogeneity and immobility of resources is anything to go by, then the theory guides as to why some firms can manage resources to earnest competitive advantage, in a business line that those in competition failed.

A study carried out by Ligang, Vedastus and Yang (2011) attempted to evaluate the relationship between resources and performance of 15 commercial banks in Tanzania, covering the 2005 to 2009 period. The paper focused on bank-specific resources attributable to financial performance and found that tangible bank-specific resources positively related to business performance; however, intangible had no support. According to Tang and Liou (2010), the totality of assets and capabilities forms the firms' corporate entity and that firms with superior resources can relatively produce output more efficiently compared with those without resources. Therefore, this thesis used the resource-based theory to analyze commercial banks' resources linkage to the revenue diversification concept as an expansion strategy. For instance, banking consolidation—merger and acquisition — allows banks to circumvent and diversify into unfamiliar territorial activities such as bancassurance, trading in foreign exchange, off-balance sheet businesses and other investments which generate non-interest income perceived less regulated and relatively stable.

Besides, the theory links the market with product mix activities to enhance financial performance as well as how to manage resources over time. Banks resources refer to both tangible and intangible assets, owned and controlled, immobile and unique resources such as human, information, marketing and financial. The use of a single resource in several business lines is the diversification pattern, most often considered in business policy (Wan et al., 2011). The theory links diversification as a strategy of applying the bank's unemployed resources such as capital, skills, technology, innovative products and services in profitable but related activities, which use similar resources. These expand the scale and scope of banks both vertically and horizontally, with the ultimate goal of improving financial performance (Wernerfelt, 1984).

Due to the economies of scale, banks can provide quality products/services at lower input costs using unemployed, owned and controlled resources while charging higher prices (Barney & Peteraf, 2003). This exploitation of potential synergies expected from banks related activities, support and competencies could lead to a sustainable competitive advantage and therefore, a superior profit. This theory seems more promising and intuitively appealing, yet undeveloped in the context of revenue diversification and financial performance in the banking business context. Based on the arguments that created a need to undertake this study, which perhaps would contribute to the validation and prescription of RBT in the context of the developing market, and precisely the case of the Kenyan banking sector.

Based on the RBT, this study expected variables to relate positively to each other because diversified banks combine different revenue-bearing activities to stabilize their revenue and report higher interest spread paired up with higher profits than counterparts (Baele et al., 2007). Through merger and acquisition, an entity gets resources to combine technically with the existing resources to enhance the intermediation process, with a total effect of increasing financial returns. Through diversification, the size scope/scale benefits bring on board the logic of resources synergies that allows exploitation of the capacity of the existing resource shared with a different business segment. Based on these arguments, the theory anticipates a positive relationship with the four variables because resources availability motivates a bank to venture into the profitable markets using shared resources, which in turn increases the level of technical efficiency through minimized intermediation cost while enhancing banks financial performance.

2.2.2 Market Power Theory

This is a growth theory introduced by Cowlings and Waterson (1976). The theory approach emphasizes the use of diversification as a monopolistic strategy and assumes that a firm can position itself in a market using diversification as a strategy to gain a conglomerate power. By increasing market power, a firm with a significant market share can charge its products and services at lower cost-per-unit in order to edge competitors out of the market and recoup from the market after the competitors' exit. Conglomerate firms exercise market power through cross-subsidization, predatory pricing, exploitation of opportunities and reciprocity buying and selling among large diversified firms (Montgomery & Wernerfelt, 1988). The analysis of bank performance through the market power theory posits that the market structure of the industry often influences the key financial performance ratios.

According to Tregenna (2009), market power can be analysed within two distinct approaches. That is, the level of concentration and the banking market, which potentially gives rise to market power and subsequently may raise the banks' financial performance. Banks in a more concentrated market most likely to make super-normal profits by lowering deposits rates while charging higher loan rates. This is because of explicit or implicit collusive or monopolistic reasons than the firms operating in less concentrated markets irrespective of technical efficiency levels. This case contrasts the efficient market assumption, which postulates that market share influences a bank's financial performance and it assumes that only large banks with differentiated products exercise market power and can charge higher prices to increase profits.

According to Montgomery and Wernerfelt (1988), a bank with market power can affect either the total quantity or the prevailing price in the marketplace. Price makers face a downward-sloping demand curve, such that price increases lead to a lower volume demanded. The decrease in supply because of the exercise of market power creates economic deadweight losses, often viewed as socially undesirable. As a result, many countries have anti-trust or other legislation intended to limit the ability of banks to accrue market power. Such law more than often regulates mergers and acquisitions while sometimes introducing judicial authority to compel firms to divestiture. Thus, this model makes market power a virtue of controlling a large portion of the market concentration.

In some extreme cases of monopoly and monopsony, a firm controls the entire market (Barney & Peteraf, 2003). However, market size alone is not the only indicator of market power because a highly concentrated market may be contestable if there are no barriers to entry or exit. Thus, it limits the incumbent firm's ability to raise prices above competitive levels. Market power gives firms the ability to engage in unilateral anti-competitive behaviour. Some of the practices that firms with market power engage in include predatory pricing, product commerce (or tying) and the creation of over-capacity or other barriers to entry (Barney & Peteraf, 2003). If no individual participant in the market with significant market power, then anti-competitive behaviour can take place only through collusion or the exercise of a group of participants' collective market power. This theory connects to the independent variable revenue diversification, which means that the more market a bank controls, the higher its financial performance.

The theory links diversification as a strategy that banks use to penetrate a profitable market segment using gains made from another market to gain market power (Palich et al., 2000). A commercial bank can use profits made in its traditional banking activities such as loan creation to penetrate the insurance market, foreign exchange trading, securities trading and investment banking. After positioning itself in these markets or segments, a bank then can use the market power gains to control prices of products/services through discounts, subsidies and reciprocal purchase and selling to prevent entry into the market.

Therefore, using market power logic, a bank can earn profits above the market average. In other words, a bank can profitably make prices equal to the marginal cost of production using market power as an essential strategy and may reduce risk in one revenue line through diversification while taking other risks to gain in another revenue line. Despite this argument, Montgomery and Wernerfelt (1988) argued that the theory asserts more on collusive market power instead of the economy of scope and further opined that not all dominant firms seek to diversify. Based on these arguments, the market power encourages a firm to perform better, given the diversification strategy and thus, the study expected to demonstrate a positive linkage of market power theory in the context of revenue diversification and the financial performance of commercial banks in Kenya.

2.2.3 Agency Problem Theory

This theory was introduced by Ross (1973) as a two-party relationship theory with a mismatched interest in a contractual engagement. The theory assumes that there is a need for power separation between managers and owners. However, this assumption

can amplify the divergences of each party's views. On the contrary, business focus reduces agency conflicts instead of competitive, regulatory and capital markets environment benefits. Agency problem theory highlights the paybacks ensuing to directors at the expense of the stockholders because of the executive's decisions (Lin, 2010). In China, Rwegasira and Li (2008) examined diversification and performance relationships in the framework of agency problem theory using listed companies at Shenzhen and Shanghai stock markets, which had exhibited high growth from 2003 to 2004. The study findings were contrary to most of the results from developed countries and emerging markets, which reported a statistically significant U-shape relationship. The outcome was also inconsistent with the notion that managerial discretion contributes to the diversification decision and results in discount firm value.

This theory links diversification as a strategy used by bank managers to gain both self-interests as well as shareholders' objectives. More often than not, bank managers would invest in optimizing profits, thus shareholders' wealth, despite the high agency costs. Most commercial banks have no significant shareholders, in which case, the assets of a bank end up in the hands of the managers. These managers then would use diversification to pursue value destructive activities while enhancing self-interests at the expense of the shareholders. In the context of banking, agency conflicts arise among shareholders and bondholders, independent auditors and board of directors, managers and regulators, managers and creditors, controlling and non-controlling shareholders, and management and subordinates (Mulwa & Kosgei, 2016). Based on these arguments, the theory links diversification as a strategy used by bank managers to gain both self-interests as well as shareholders' objectives. More often than not, bank managers would invest in optimizing profits, thus shareholders' wealth.

2.2.4 Summary of Theoretical Review

The review of theoretical arguments manifested to be difficult in making a comparison among these three theories. However, the resource-based approach seemed superior to market power and agency theories. Thus, resource-based theory anchored this study. The resources based theory assumes that a firm is motivated by untapped resources to diversify into different business activities that allow the bank to penetrates a new market and expands its capital base, which often results in a size increase. The market power theory suggests that a firm uses market power to outcompete competition while producing optimally (efficient) despite management complexity. This ultimately leads to an agency problem, which suggests that managers use diversification as a strategy to deploy the firm's resources to profitable opportunities to maximize shareholders' wealth or otherwise self-enrichment.

The theoretical justifications on why firms diversify to enhance performance vary considerably. Both the resources-based and market-power are consistent with profit maximization, however, the former embraces the use of resources as a pre-requisite to diversification while the latter embraces the aftermath of diversification with a focus on the competition effect of diversification. Agency-problem theory dwells on managerial utility concerning conflicting interests and perceives diversification as an opportunity to self-enrich, if not to maximize shareholders wealth. Concisely, the market-power theory and agency-problem theories draw their relevance to the study concepts from resources view as an antecedence. Therefore, the theoretical arguments vary among the sampled theories, making it difficult to generalize on a single theory to interlink the four theoretical concepts, but resources based theory seemed potential.

2.3 Empirical Literature Review

This section presents the review of empirical studies relevant to the concepts of revenue diversification, technical efficiency, size and financial performance, and ends with a summary table of the knowledge gap.

2.3.1 Revenue Diversification and Financial Performance

Tran, Hoanga, Nguyena, and Hoanga (2020) investigated the impact of income diversification on liquidity creation and bank financial performance in Vietnamese banks, spanning 2007 to 2017. The study adopted panel ordinary least square with fixed-effect and general moment method of estimation. The study found a negative relationship between income diversification and both return on assets and return on equity. The finding was consistent with an earlier study by Nguyen (2019) on Vietnamese banks, and Berger, Hasan and Zhou (2010) on Russian banks. The three studies found that focused banks reported higher profits as well as lower costs and associated the negativity to lack of managerial expertise on the new income bearing business line and likewise constrained by thicker capital buffer requirement. According to the authors, these further resulted in inefficient allocation of available resources or simply managers' lack of incentives for diversification to maximize profits or shareholders wealth maximization.

Ndungu and Muturi (2019) assessed the effect of income diversification, geographical diversification and product diversification on the financial performance of commercial banks in Kenya. The study used secondary data from commercial banks spanning 2013 to 2017. The study estimated using GMM fixed effects and random effects models and

found that income and geographical diversification had positive effects, but product diversification hurt the financial performance. Moreover, the finding concurred with a study conducted by Githaiga, Yegon and Komen (2019) which investigated the effect of income diversification on the performance of Kenyan commercial banks using panel data from 31 commercial banks over the study period 2008 to 2017. The study found that income diversification had a positive effect on bank performance.

Nisar, Peng, Wang and Ashraf (2018) examined the impact of revenue diversification on the profitability and stability of banks using a panel data set from 200 banks across South Asian countries over the period 2000 to 2014. The study found that diversification into non-interest income had a positive impact on profitability and stability. Further, the study posited that while fees and commission incomes hurt profitability and stability, other non-interest income has a positive impact. Mundi (2019) investigated the impact of income diversification on banks performance using a database from 74 commercial banks in India spanning 2005 to 2014. Kumar, Chaudhuri and Sharma (2019) investigated the impact of income diversification on the profitability of Indian banks using 10-year data from 2008 to 2017. The study found that income diversification improved banks profitability. The study found a moderate positive relationship between fee income and return on equity. The three studies used return on equity non-interest as a proxy for profitability and the current considered revenue components diversification with concentrated on return on assets as a profitability indicator.

Natalia et al. (2016) empirically examined the effect of revenue diversification on the stock-based return using a dataset from banks in 10 countries in the Association of

Southeast Asian Nations (ASEAN). The study modelled the investigation using a panel fixed effect and used the non-interest income ratio to total interest as a measure for revenue diversification. The study found that revenue diversification had no effect on a bank's market value but fee income had a significant positive effect on returns. The study further provided evidence that large banks with good capital could increase value by diversifying non-interest income. Cetin (2018) paper examined the impact of non-interest income on bank profitability using a data set from across 2005 countries from 1999-2015. The study indicated that non-interest income had a positive and significant impact on banks' return on assets for high-income countries, and surprised that there was no relationship found between medium and low-income countries. Belguith and Bellouma (2017) studied diversification in income structure, profitability and stability of the Tunisian banking sector over the period 2001 to 2014, using panel estimations. The study found that revenue diversifications interest and non-interest revenue related positively to bank profitability and stability. The reviewed studies used non-interest income and a Bayesian Impulse response analysis; however, the current study used a diversification index.

Gupta and Sen (2016) paper attempted to investigate the income diversification level for commercial banks in India covering 20 years study period. The entire study classified data into four periods of five years each, from 1995 to 2014 and used data obtained from the Reserve Bank of India. The study compared both private and public banks to unearth how influential the diversification level on the financial performance of commercial banks proxied by return on assets. The study used the Generalized Method of Moment (GMM) techniques to forestall the perceived endogeneity and auto-correlation challenges. The study found that public banks more diversified than private

sector banks in terms of non-interest income activities but the returns were not as high as compared to the risk taken by the banks for the diversification and found a negative relationship between diversification and bank's performance. The study supports findings by Nguyen (2019), which established a negative relationship between revenue diversification and bank performance using a dataset from 26 Vietnamese Commercial Banks from 2010 to 2018. The author found that diversification negatively influences profitability and associated negativity with higher risk exposure.

In an attempt to analyze the linkage between banks' interest diversification and profitability Gambacorta, Scatigna and Yang (2014) did a comparative study using panel data from 98 banks across 27 countries in the EU, USA and Asia, from the years 1994 to 2012. The study found a positive linear relationship only up to 30 percent of the non-interest diversification level, after which the relationship became negative. However, the focus of the research was on developed markets and the authors' findings conflicted with other earlier US studies (Stiroh, 2004; DeYoung & Rice, 2004) though in concurrence with earlier EU studies (Staikouras & Wood, 2006; Chiorazzo et al., 2008). Although the focus of the research was on developed markets, the findings seemed to lack generalization validity across developed markets. Thus, the current study introduced the size and technical efficiency, which perhaps could shade more light in the context of emerging markets.

In the USA banking sector, Saunders, Schmid and Ingo (2014) investigated whether the restriction of commercial banks activities to the only core retail and traditional banking affects the relationship between revenue diversification and financial performance across 10,341 banks between 2002 and 2013. The authors found that a higher ratio of

non-interest income to interest income was associated with an increased performance during the crisis period than the pre-crisis and post-crisis periods. This conclusion concurs with a strange finding by DeYoung and Torna (2013) relative to most US studies, which found a negative relationship. Despite the conflicting findings, the study focused on the developed market with a focus on the crisis period and as such, generalizing the findings across different markets during the non-crisis regime may not be valid. The current study assessed the effect of revenue diversification during both normal and crisis periods.

Brighi and Venturelli (2015) used unbalanced data from 3,549 Italian banks between 2006 and 2012 to scrutinize the effect of income diversification on pecuniary performance. They found that both geographical and revenue diversification smoothened the adverse effects during the financial crisis period, with an ultimately positive impact on profitability. Guerry and Wallmeier (2017) used unbalanced data from listed banks across 17 European countries covering 1998 to 2013 in an attempt to assess the effect of asset-based diversification on bank valuation. The study findings suggested that diversification discount declined during the financial crisis and implied a positive association. The finding was inconsistent with Goddard et al. (2008) study, which found that diversification negatively related to business performance for credit unions in the USA. However, this study used the asset-based approach to measure the degree of diversification, which wrestles the perceived big numbers measurement hitches relative to income-based measures. The present study assessed the influence of revenue diversification on financial performance as a focus and the practical consideration of technical efficiency and size.

In an emerging economy, Tarazi, Tacneg and Mestier (2013) examined revenue diversification impact on financial performance using an unbalance dataset from 39 Philippines commercial banks between 1999 and 2005. The authors' findings revealed that contrary to the western economies, revenue diversification increased financial performance, and primarily when banks engaged in the trading of government securities. The study further showed that foreign banks benefited more from diversification than local banks. This finding concurred with others authors' findings such as Sanya and Wolfe (2011) and Natalia et al. (2016) but in contrast with the finding by Lin (2010). However, Tarazi et al., (2003) study suffer from data limitation and on the usage of data from start-up banks, which had positive gross income. These start-ups seem to have been at an early growth phase or yet to break even.

Mulwa and Kosgei (2016) used a set of data from 34 banks in Kenya from 2005 to 2009 to explore whether assets, income and geographical diversification affect financial performance. The study found that income diversification affects returns financial performance negatively. The study attributed the negativity to higher costs occasioned by diversification, which according to the authors, resulted in financial performance discounts. These results concurred with an earlier study by Kiweu (2012) which reported a negative relationship between income diversification and financial performance. These studies suggested the existence of collinearity between interest and non-interest income as was evidenced by a high correlation between the two variables. Nevertheless, both the studies fell short of explaining the robustness of the diagnostic tests used and the mitigation thereof. The current study used a panel least fixed effect and introduced size as a moderator variable and technical efficiency as a mediator variable to assess and validate the scenario in Kenya.

2.3.2 Revenue Diversification, Technical Efficiency and Financial Performance

In an attempt to assess the effect of technical efficiency and profitability, Izzeldin, Mamatzakis, Murphy and Tsionas (2020) used unbalance dataset from banking institutions across 15 European countries listed in the bank scope database, over the period 2008 to 2015. The study adopted an intermediation approach and stochastic distance function measure of bank efficiency. The study assumed that banks collect funds, and use labour and physical capital to transform the funds into loans and other earning assets. The study found that technical efficiency was associated with higher profits, capital, and a lower probability of default and return volatility. Adesanya and Abere (2020) assessed the impact of the financial crisis on profit efficiency, diversification, total assets, capital and profitability using a database from Nigerian banks covering the period 1981-2017. The study proxied profit efficiency using the Translog Stochastic Frontier profit functions and analyzed the relationship using ordinary least squares. The study found that the financial crisis had an insignificant effect on the total asset, bank's diversification and capital strength while that all the variables had a positive significant effect on the profitability efficiency of banks.

Sharma (2018) modelled a study to determine an empirical linkage between technical efficiency and stock market performance of the Indian banks listed in the National Stock Exchange (NSE) using panel data spanning 10 years from 2002 to 2012. The study measured performance using economic value-added and market value-added and measured technical efficiency using data envelopment analysis. The study found a positive significant relationship between technical efficiency and market performance. Khan, Hassan, Maroney & Rubio (2016) evaluated the relationships among

diversification, efficiencies and market values using data from 1,940 publicly listed banks from 2002 to 2010. The authors found a mixed finding that efficiency related negatively with some aspects of diversification and positively with other aspects, but positively with financial performance. The scholars attributed this finding to the efficiency lag effect on performance. This finding was somewhat unexpected. However, the authors did not explain the robustness of conclusions as these interrelationships estimates have inherent challenges of controlling for both endogeneity and heterogeneity. The current study introduced firms' size as a moderator and assessed the variables using the Baron and Kenny (1986) model. This model could perhaps help in explaining the dilemma of the relationship.

In evaluating the influence of efficiency and performance relation, Arafat, Warokka, Buchdadi, and Suherman (2013) used data from 25 Indonesian banks from 2005 to 2007. The study used the ratios of bank's returns on equity, returns on assets, net interest margin over total assets as a proxy for financial performance, which non-performing loans were used as a proxy for efficiency. The study found that the composite index of size, in general, had an insignificant effect on productivity. However, a significant positive impact on return on equity and return on assets but a significantly negative effect on net interest income over total assets. These findings were in line with the empirical findings by Laeven and Levine (2007). In the current study, the proxy for both technical efficiency and size were composite, which justifies the findings' difference.

In the European banking sector, Afsharian, Kryvko and Reichling (2015) analyzed the impact of efficiency on performance using data set from 27 countries between 2005 and

2009. The scholars found that technical efficiency related more to a volatile asset with a lower market value. The study focused on developed markets with advanced capital market systems and multi-regulated financial systems. Gyan, Bakri and Rayenda (2017) investigated the moderation effects of efficiency on a diversification and performance relationship, using panel data from 319 banks. The study found a positive relationship, however, not as a moderating variable, but as an intervening variable. Kamau (2011) examined the intermediation efficiency and productivity of banks in Kenya, using data from 40 banks between 1997 and 2009. The study found that banks were 47 percent effective for constant return to scale, 56 percent effect for variable return and 84 percent effective for scale efficiency. The current research focused on the developing market with the inclusion of bank size and technical efficiency to unravel the puzzle.

Nguyen (2018) used data from the Association of Southeast Asian Nations countries from 2007 to 2014 to assess the influence of diversification on technical efficiency using the stochastic frontier approach. The study findings suggested that diversified banks had lower cost efficiency, while fund-diversified banks enjoyed higher profit efficiency and more asset-diversified banks enjoyed only higher persistent profit efficiency. The study results indicated a positive significant relationship between income diversification and bank technical efficiency. Kaur and Kaur (2013) used a panel from Indian banks over the period 1990 to 2008 to investigate the effect of cost efficiency using the data envelopment analysis. The study found a positive and significant impact of technical efficiency on profitability. Further, the study affirms that higher return on assets exhibits a more senior technical efficiency level. The current study is different from this study as it introduces technical efficiency and size in the analysis to mediate and moderate the relationship respectively.

2.3.3 Revenue Diversification, Size and Financial Performance

Aladwan (2015) evaluated whether bank size significantly affects the profitability of commercial banks in Jordan using a dataset from 2007 to 2012. The study proxied performance using returns on equity and the findings revealed a statically significant negative relationship between bank size and profitability. Surprisingly, the study found that as profitability decreased, the volume of assets increased and that small and medium-sized banks exhibited higher overall performance compared to large banks. These results supported the initial hypothesis that the smaller the bank assets the higher the profitability. Mwangi (2018) attempted to establish whether bank size influences the financial performance of commercial banks in Kenya. The study used an unbalanced panel from commercial banks spanning ten years from 2007 to 2016 and proxied size by a log of total assets against financial performance measured return on assets and return on equity. The study found a positive effect on the financial performance of commercial banks in Kenya, with a stronger size effect observed on the larger banks.

Maina, Kiragu & Kamau (2019) assessed the relationship between size and profitability of commercial banks in Kenya using secondary data obtained from central bank annual reports from 2012 to 2016. The study measured bank size using deposits and gross loans while profitability was measured using the annual net profit after tax. The study established a positive significant effect of size on a bank's profitability. Odundo and Orwaru (2018) attempted to establish whether bank size had a significant effect on the financial stability of commercial banks using unbalanced panel data from 10 Kenyan banks listed in the Nairobi stock exchange from 2011 to 2017. The study noted that the

banks controlled 71 percent of the Kenyan banking market and found that that bank size exhibited a negative and statistical effect on bank stability.

Ngware, Olweny and Muturi (2020) investigated whether bank size moderated the relationship between banks' portfolio diversification and financial performance of commercial banks in Kenya. The study used unbalanced panel data sourced from 43 commercial banks spanning 2003 to 2017 and proxied financial performance using return on assets and equity. The study revealed a positive significant effect of bank size on both RoE and RoA and that bank size moderated the relationship between banks portfolio diversification and financial performance of banks in Kenya. In an attempt to evaluate the influence of bank size on performance and diversification relations, Goddard et al. (2008) used panel data from the US credit union for the period between 1993 and 2004. The research found that the negative indirect exposure effect for large firms outweighed the positive direct exposure effects. The study concluded that diversification in revenue was useful to large and small credit unions in the USA. However, the research by Goddard et al. (2008) was based on the credit union with members' welfare motive and lesser regulated compared to the heavily regulated commercial banks. Also, the credit union's objective can be different from the bank's wealth maximization motives.

To investigate the size effect on the relationship between financial performance and diversification in the EU banking industry, Lepetit, Rous and Tarazi (2008) used a data set from 734 banks for the period between 1996 and 2002. The study decomposed non-interest activities into trading, fees and commission. In consideration of the bank size effect, they found a definite link between diversification and financial performance for

smaller banks and opined as driven primarily by non-interest income. According to the authors, size correlates with performance through economies of scale. The study further revealed that larger firm dominates in all aspects of market shares and as such have higher bargaining power and report higher returns due to efficient control of expenses. However, the study suggested that a larger share of trading activities might not be associated with higher performance for smaller banks, but only in some cases. The current study controlled for the size of the bank in the process of examining the main direct affiliation between revenue diversification and performance.

Muhindi and Ngaba (2018) used panel data from 2012 to 2016 to assess the power of size on the financial performance of Kenyan banks. The study utilized the number of branches, capital base, and the number of customer deposits, loans and advances as the key variables. The study found a positive relationship between size and financial performance and revealed that larger banks exhibit a higher return on assets relative to medium and small. However, an earlier study by Mulwa and Kosgei (2016) found a negative relationship between size and financial performance, which conflict with Muhindi and Ngaba (2018) findings. However, the current study decomposed revenue components into interest and non-interest diversification and assessed the effects separately while at the same time assessing the mediation effects of technical efficiency and moderation effect of bank size, which jointly, could address the measurement concern and reduce the divergence gap.

2.3.4 Revenue Diversification, Technical Efficiency, Size and Financial Performance

Chronopoulos, Girardone and Nankervis (2011) assessed whether the size of a bank matter in cost and profit efficiency and consideration of diversification level. The study used a data set from 2001 to 2007 sourced from accessional countries and estimated the efficiencies using data envelopment analysis. Nevertheless, the results indicated that banks suffered from relatively high cost and profit inefficiencies across countries and found sufficient evidence that larger banks were more diversified and efficient in terms of cost as well as profits compared to small banks and related positively. The Chronopoulos et al. (2011) study focused on size, diversification, cost and profit efficiencies, while the current study had a focus on diversification, technical efficiency, size and return on assets.

Mulwa (2020) assessed the effect of income and assets diversification on market valuation using a dataset from commercial banks listed in the Nairobi stock exchange for the period 2009 to 2017. The study controlled the size effect or rather market power effect on the relationship and found that the relationship between both income and assets diversification and market values was non-linear and positive. The author attributed the nonlinearity to the fact that the Kenyan financial market was efficient enough to place value on the diversification decision of commercial banks. The study concentrated on commercial banks trading in the Nairobi stock exchange and on assets and assets diversification and market value. The current study had a focus on revenue streams or components diversification effect returns on assets of all commercial banks both listed and unlisted in the Nairobi stock exchange.

Asongu and Odhiambo (2019) study examined whether market power or economies of scale influences the relationship between bank size and efficiency. The study used a panel of 162 African banks spanning 2001 to 2011 and analyzed the data empirically using fixed-effects regressions. The study found that bank size increases bank interest rate margins with an inverted U-shaped nexus, whilst market power and economies of scale did not influence the relationship significantly. Alhassan and Tetteh (2017) paper explored the relationship between income diversification, size and efficiency of the 26 universal banks in Ghana from 2003 to 2011. The study adopted the stochastic frontier analysis technique to estimate cost and profit efficiency scores. The study found that large banks were more efficient relative to smaller ones, and a non-linear relationship between income diversification and efficiencies with the bank size as an important catalyst in enabling banks to exploit the potential benefits of income diversification.

Kaur and Kaur (2013) investigated the cost efficiency of Indian public and private sector banks over the period 1990-2008 with unbalanced panel data using the non-parametric data envelopment analysis. The study found a positive significant association between efficiency size and profitability of banks, which suggested that banks with a higher return on assets exhibit higher efficiency scores. In an endeavour to examine the influence of both ownership and size on efficiency and performance, Bonin, Hassan and Watchtel (2004) used panel data from 225 banks across eleven transitioning countries from 1996 to 2000. They concluded that private ownership does not affect efficiency, but foreign-owned banks were more cost-efficient relative to other banks. The study also observes that efficiency declined with bank size. The current study assessed the relationships using both technical efficiency and bank size to diffuse the relationship tension.

Sanderson and Pierre (2016) evaluated the relationships among efficiency, size and performance of banks in Zimbabwe between 2009 and 2014. The study found that efficiency related positively to financial performance and suggested that an increase in economic activities increases the demand for financial services, which increases effectiveness. Janoudi (2014) assessed the influence of efficiency on bank returns using data from 27 banks in EU countries from 2004 to 2010. They argued that banks that had improved in efficiency catch-up related positively with the cost and profit inefficiencies while bank size had a positive influence on financial performance, however, the studies centred on cost and profit efficiency to return relationships.

Kamau (2011) adopted DEA to assess the intermediation efficiency of banks in Kenya using a data set from 40 banks spanning 1997 to 2009. The study found that most banks were inefficient and that larger banks were more efficient than the small and medium banks attributable to the availability of resources, adopt new/latest technology and economies of scale. Stiroh (2004) study found evidence of size-related diversification benefits, but a non-linear relationship attributable to management complexity and agency problems. Thus, size-related diversification benefits do not appear to be a compelling motivation for the continued growth of the larger banks. As banks steadily expand into new activities while transforming the existing ones, the regulator and the equity investors follow these leverage changes to identify the risks associated with the revenue streams and devote more attention to these activities not to escalate.

2.3.5 Summary of Knowledge Gap

Table 2.1 summarizes reviewed empirical studies, the main findings, the knowledge gap and how the current study addressed the knowledge gap.

Table 2:1: Summary of Literature Review and Knowledge Gap

Author (s)	Research Focus	Key Findings	Knowledge Gap	Current Study
Guerry and Wallmeier (2017)	The effects of diversification on bank valuation in the USA	Diversification discounts in bank valuation declined during the financial crisis.	- Based on bank valuation - Used market capitalization-stock - Used financial institutions in general - Used fixed-effect model - Used a less robust asset-based diversification measure, the Sharpe ratio, which underestimates diversification	- Based on financial performance - Used accounting return on assets - It is focused on commercial banks - Used a random effect model - Used a robust income-based diversification measure, Herfindahl-Hirschman Index
Saunders, Schmid and Ingo (2014)	Examined the relationship between the ratio of non-interest to interest income, size and bank performance during different market regimes in the USA	Diversification was associated with higher performance and stronger during the crisis period.	- Used ratio to measure diversification - It is focused on the developed market - It is focused on the crisis market era. - Used market share as a proxy for size as a moderator	- Herfindahl-Hirschman Index (HHI) to measure diversification - It is focused on developing the economy - Focused on all regimes & periods - Used composite index as a proxy for size as a moderator

Author (s)	Research Focus	Key Findings	Knowledge Gap	Current Study
Khan, Hassan, Maroney and Rubio (2016)	Investigated the relationship between diversification, efficiency & excess market value	Efficiency and excess value related positively with each other while both related negatively with diversifications.	- Measured performance by Tobin's Q - Focused on the developed market - Focused on general efficiency relation to diversification	- Financial Performance measured by returns on assets. - Focused on developing markets - Focused on technical efficiency concerning revenue diversification
Sanderson and Pierre (2016)	Evaluated the cost and revenue efficiency of financial performance	Domestic and private banks were more efficient compared to foreign and public banks, respectively.	- Carried out during crisis time - Based on the accounting measures benefit approaches - Focused on special crisis period	- Focused on a normal economy - Based on returns on assets - Non-crisis financial period
Afsharian, Kryvko and Reichling (2015)	The efficiency effect on the financial performance of publically traded European banks.	Pure technical efficiency-related was more to a volatile asset with a lower market value.	- Focused on allocative efficiency - Used returns on equity - Developed market	- Focused on technical efficiency - Used Return on Assets.
Brighi and Venturelli (2015)	Assessed the effects of diversification on bank performance.	Diversification negatively affected bank risk-adjusted profitability.	- Performance proxied by Z-score and risk-adjusted returns. - Focused on the crisis period & developed market.	- Used ROA to proxy performance. - Focused on a normal period and in developing markets.

Author (s)	Research Focus	Key Findings	Knowledge Gap	Current Study
Gambacorta, Scatigna and Yang (2014)	Evaluated diversification and bank profitability	Diversification related positively with profitability only up to 30 percent of the diversification ratio and then thereafter declined.	- Focused on the developed market - Used a non-linear approach - Focused on countries with restricted banking activities	- Focused on developing markets - Assessed linearity relationship - Focused on a country context without bank activities restriction
Tarazi, Tacneng and Meslier (2013)	Effect of revenue diversification on the financial performance of banks	Revenue diversification increased bank performance, especially when banks engaged actively in the trading of government securities.	- Focused on developed nations - The period of 6 years was concise and thus limited data - Focused on listed banks	- Focused on developing markets - Extended study period to 10 years - Combined listed and unlisted banks
Arafat, Warokka, Buchdadi and Suherman (2013)	Assessed the influence of revenue efficiency on diversification and financial performance relation.	Diversification and financial performance variables had less influence on bank efficiency.	- Focused on general efficiency as measured by non-performing loans and their influence on both diversification and financial performance	- Focused on the effect of technical efficiency on revenue diversification - Used input-oriented ratios to measure technical efficiency

Source: Literature Review, 2021

2.4 Conceptual Framework and Hypotheses

Largely, a framework enhances empiricism and rigour whilst improving research by making the findings more meaningful, acceptable and ensure generalizability (Imenda, 2014). A study framework informs on the route taken during the investigation and how grounded resolutely on the theoretical constructs/concepts. The essence is to advance argumentation from the researcher's experience, the literature review explanations and theoretical justification (Kivunja, C. (2018). A study framework can adopt a theoretical or a conceptual framework. A theoretical framework often is based on the development of theory and adopted to shape own research whilst guiding the study within the confines of the accepted theories and scholarly contribution. The conceptual framework on the other hand explains a phenomenon and links it with the concepts, empirical study and relevant existing theories (Adom et al., 2018).

This study adopted the conceptual framework model, which describes the relationship between the main concepts in a logical way to display how ideas relate. Noteworthy that a theoretical framework is a sub-set of the conceptual framework, which seem the umbrella term relating to all the concepts (Kivunja, 2018). This study leaned towards positivism philosophical orientation and deductive theoretical approach (Crotty, 2003). As such, it used the existing theories to connect the conceptualized variables and developed hypotheses for testing to confirm the assumption. This was important in connecting and limiting the scope of the relevant data variables to the existing knowledge. The resource-based theory guided the study as the most relevant theory, supported by market power and agency problem theories. The theoretical framework provided the basis for the hypothesis and choice of research methods. Therefore, this section contains the conceptual model and the conceptual explanation, which guided the study on the concepts perceived relationships.

2.4.1 Conceptual Model

Based on the research problem formulation, theoretical and empirical literature reviews and variables constructs, the study developed a conceptual framework, as shown in Figure 2.1. The model enhances the understanding of the perceived theorized relationships between the four concepts and the arrows indicate the proposed direction of the link along with the null hypotheses. The figure shows that revenue diversification could relate directly to financial performance as shown by the pointer represented by the first null hypothesis (H_1). That is, when a bank spots a profitable opportunity, it invests its untapped resources to engage in non-traditional banking activities. This perhaps expands the revenue base and as such increases financial performance. Previous studies findings contrast each other, for instance, Gambacorta et al. (2014) reported a positive relationship while others reported a negative association. These conflicting views could be resolved by assessing the highlighted four variables. The resources based theory could support the proposition, as represented by the first null hypothesis (H_1) in Figure 2.1.

Secondly, the model predicts that revenue diversification indirectly affects financial performance through the mediation effect of technical efficiency as shown by arrows represented by the second null hypothesis (H_2). This could occur through the intermediation process where banks raise funds through customer deposits, shareholders' capital mobilization and transform them into loans and other investments. Equally, bank managers after recognizing diversification as a strategy could tighten the control of input mix while making efficient strategic decisions. Technical efficiency is a comparison between actual production and possible production generated from the same input by the most profitable bank. Thus, if a bank becomes more efficient, it reports a higher revenue margin and as such higher profits, which ultimately translate to higher financial performance. Both the resource-based theory and agency problem theory could support

this connotation. The proposition was that technical efficiency mediates revenue diversification strategy to enhance financial performance as shown by the second null hypothesis (H_2) in Figure 2.1.

Thirdly, revenue diversification could influence financial performance through the size moderation effect as shown by the arrow represented by the third null hypothesis (H_3). Banks intend to increase sizes through mergers and acquisitions while leveraging on average cost reduction per unit with enhanced capital base and market share. This could concur with the perception that larger banks are influential in strategic decisions than small banks. Thus, a bank's size uniqueness in terms of assets, capital and reserve, deposits, and the number of accounts could influence the quality and choices on the market activities undertaken by a bank, which then affects the strength of financial performance. Earlier studies conflicted with each other. For instance, a survey carried out by Gupta et al. (2016) reported negative relations, while Lepetit et al. (2008) found a positive connection. All the three theories; resources-based theory, agency problem, and market-power theory support this proposition jointly as shown by the third null hypothesis (H_3) in Figure 2.1.

Lastly, revenue diversification, technical efficiency and size could jointly influence financial performance as shown by the arrow represented by the fourth null hypothesis (H_4). Several scholars have investigated the relationship individually and reported divergent views. Bank managers may consider using existing idle resources to diversify into different markets, which effectively increases the market base while maintaining the technical efficiency level. This implies that as banks expand in the market, capital and revenue, management complexity, agency cost, and scale inefficiencies sets in. This proposition could be represented by resources based theory, market power theory, and agency theory, as depicted in Figure 2.1 using the fourth null hypothesis (H_4).

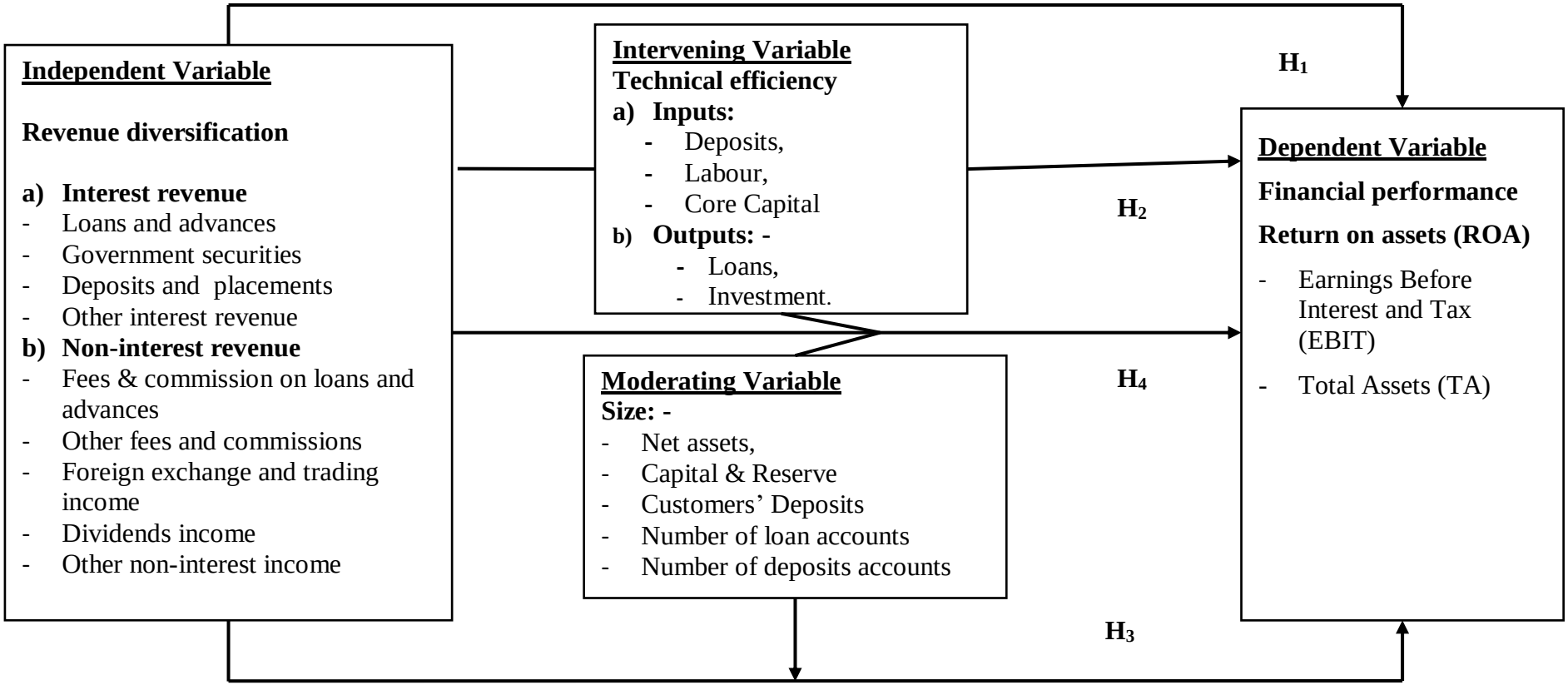


Figure 2.1: Conceptual Model

Source: Literature Review, 2021

2.4.2 Conceptual Hypotheses

The research problem stated in chapter one presented an unanswered research question, which the current study endeavours to address. The research question target to establish the relationship between revenue diversification, technical efficiency, size and financial performance of commercial banks in Kenya. Research hypotheses developed to answer such as sated research question as a way of a proposition assumed to offer a possible and reasonable solution (Imenda, 2014). In effect, hypotheses provide direction and guide the collection and analysis of research data. The testing of hypotheses forms the foundation of making conclusions from inferential statistics. Therefore, to make a specific prediction about the main objective of the current study, the study developed four specific null hypotheses to assess the existence of relationships between revenue diversification, technical efficiency, size and financial performance of commercial banks in Kenya. The specific null hypotheses were:

H_1: Revenue diversification does not significantly affect financial performance of commercial banks in Kenya.

H_2: Technical efficiency does not mediate the relationship between revenue diversification and financial performance of commercial banks in Kenya.

H_3: Size does not moderate the relationship between revenue diversification and financial performance of commercial banks in Kenya.

H_4: Jointly revenue diversification, technical efficiency and size do not significantly affect financial performance of commercial banks in Kenya.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology techniques and procedures used to carry out this study. These include the research philosophy, research design, population of the study, data collection, panel data model and diagnostic tests, operationalization of variables, and ends with data analysis and presentation.

3.2 Research Philosophy

Research philosophy refers to a system of norms and conventions about knowledge generation (Mackenzie & Knipe, 2006). In other words, research philosophical orientation depends on some underlying assumptions (paradigms) such as ontology, epistemology and axiology, which combined, shapes the entire research design (Kivunja & Kuyini, 2017). Ontology relates to what could constitute the reality of the subject matter under investigation while epistemology validates the process and source of knowledge on reality used to develop universal laws. Axiology relates to the researcher's ethical and values consideration in the research process. Based on the paradigm literature review, researchers classify philosophical orientations into positivism, realism, interpretivism, post-modernism and pragmatism.

Positivism orientation narrates about a deep-thinking position of a natural scientist and applies the principles of natural science in undertaking an objective and quantifiable observations on social reality to allow for a law-like generalization (Scotland, 2012). The twentieth-century Vienna Circle scientists as cited by Crotty (2003) developed positivism as a philosophical orientation that propagates on a positivist single-mindedness on rigorously and systematic empiricist methods

intended to produce unadulterated data and uninfluenced pieces of evidence (Crotty, 2003). Therefore, positivists rely on data observations, existing theories and empirical evidence to develop testable hypotheses to confirm or refute a theory.

Interpretivism emerged as a critique of positivism but from a subjectivist perspective that human beings stand dissimilar from physical sensations and as such, examined differently (Mackenzie & Knipe, 2006). Interpretivism assumes knowledge subjectivity based on the researcher's experience as opposed to reality (Kivunja & Kuyini, 2017). Interpretivism aim at generating fresh understandings of realities with a focus on the researcher's familiarities and cultural artifacts while seeking to include participants as well as personal interpretations on research work.

Realism emerged from a critical review of positivism and post-modernism and thus, stands in the middle ground of both (Reed, 2005). Realism assumes reality is conditional and hardly understood without the involvement of the actors. It focuses more on explaining the use of the human sense of seeing and experience on the fundamental constructs of reality (Kirongo & Odoyo, 2020). Thus, for critical realists, truth is the most significant vital metaphysical thought, an organized and coated ontology being critical.

Pragmatism concerns with the applications of what works as a solution to a problem instead of the methods of use (Scotland, 2012). Pragmatist focuses on the problems solving method in the real world and as such, use mixed methods that transect across positivism and interpretivism (Mackenzie & Knipe, 2006). Pragmatist ontology, epistemology, and axiology centre on civilizing practice and embrace a broader range of research strategies, and choices compelled by the specific nature of research problems. Pragmatism does not belong to any philosophical system and reality, thus

researchers have freedom of choice and use any methods, techniques, and procedures that best meet the scientific research needs.

Post-modernism extrapolates the critique on positivism beyond that of interpretivism and attribute prominence to the role of language (Kirongo & Odoyo, 2020). Principally, it recognises the power relation and the role of language between the researcher and research subject matter to shape knowledge (Scotland, 2012). Post-modernism stresses the biosphere creation and protagonist of linguistic and power relations. Postmodernist axiology is radically reflexive and seeks to interrogate the conventional habits of philosophy and offer a voice to the marginalized and silenced unconventional worldviews by a dominant perspective. It stretches beyond interpretivism in the critique of positivism and objectivism, while attributing even more importance to the role of language.

Based on the preview of the five philosophical orientations, the current research adopted positivism research orientation. That is the study considered the research motivation, the type of examination, the researcher degree of engrossment, the sampling techniques, data collection procedures and analysis. The positivism orientation seemed plausible compared to other orientations as it puts more emphasis on quantifications, objectivity, and application of scientific principles as the best way to generate knowledge based on extensive data samples, theories, and hypotheses testing. The study followed scientific procedures and entailed an assessment of the relationships among the four research concepts aimed at developing a generalized universal rule to explain and predict commercial bank's financial performance based on revenue diversification behaviours, and in the presence of technical efficiency and size s mediator and moderator respectively.

3.3 Research Design

Research design is a conceptual outline within which a researcher conducts an investigation using the best strategy that professes to answer the research question (Reed, 2005). It refers to the procedures enjoined with requirements for collecting and analyzing data in such a way that it purposes to conglomerate relevance to the research goal. Research design is essential because it organizes and synchronizes various research procedures to yield maximum information economically while revealing possible errors and shortages at the initial stage (Kothari, 2010). In other words, a good research design minimizes bias, flexible, appropriate, efficient and economical while generating maximum information. Scholars have classified research designs into descriptive, explanatory, exploratory and experimental.

Descriptive research design describes the phenomenon as it appears while establishing the relationships between variables through hypothesis testing to develop inferential generalization principles or theories with universal validity (Creswell, 2014). Descriptive research design includes observational studies, correlational studies and longitudinal (cohort or panel) studies that explore relationships using correlation and multiple regression analysis. The descriptive design ascertains and acquires quantified evidence on the characteristic of a specific issue and describes a social structure, or events, in which a researcher witnesses without alteration and describes the research findings in line with the research questions. Descriptive statistics strictly follow scientific procedures of objectivity in data collection, sampling, analysis and conclusion, which makes it more accurate and precise compared to other research designs.

Experimental research design allows for variables manipulation under specified conditions while testing for causal relationships (Kothari, 2010). In short, control means

holding a factor constant while others factors are free to vary in the experiment. Experimental research design is causal and concerns the cause-effect relationship between variables. It evaluates the causal relationships under a manipulative situation. In the trial or investigation, the researcher manipulates the independent variables and the effects observed on the dependent variable while controlling for the other variables, which confound such a relationship.

The exploratory research design is applicable where there is little or scarcity of previous studies to achieve new insights and formulate a problem before advanced investigation (Kothari, 2010). The exploratory study employs a survey of literature, experience and case study. Thus, the results of exploratory research are not usually for decision-making but provide significant insight into a given situation. Explanatory research design often used to gain familiarity in unknown areas and used to formulate a problem for specific investigations or aim at formulating research design. Thus, forms the first step of research, after which a study adopts other types of research designs. Usually, the explanatory and exploratory research designs are more appropriate in a case where the problem under investigation is complex with little research knowledge or scarcity of data for analysis.

The current study adopted a descriptive research design to examine the relationships between revenue diversification, technical efficiency, size and financial performance. That is the study followed scientific procedures in assessing the commercial banks past data leaned on quantitative with a focus on objectivity in the examination of interrelationships between variables and the use of the sample to study the entire banking population. The study strictly followed positivism objectivity, which is a scientific procedure in data collection, sampling analysis and conclusion based on published data.

3.4 Population of the Study

The study targeted all the registered commercial banks in Kenya, spanning 2009 to 2018. All active banks in Kenya report the audited financial performance to CBK for validation, approval and publication on annual basis. The study included banks registered during the period and excluded banks under statutory management, In-Receivership, and In-Liquidation. The study targeted accumulatively 338 commercial banks as per the CBK annual reports database as tabulated in Table 3.1

Table: 3.1 Target Population

Years	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Target	46	44	44	44	44	44	43	43	43	43	438

Source: CBK Database

The study period from 2009 to 2018 was unique relative to the preceding years. That is the analysis of the financial statement revealed that virtually all banks reported stable and increasingly high profits in the periods, despite the stringent structural and regulatory adjustment implemented by the regulator (Cytonn, 2017). This was so despite the financial shock such as the USA credit crisis, Kenya's successive post-election violence inertia during 2007, 2013 and 2017. Similarly, banks adopted massive financial technology (fintech) and there was an influx of micro-financial institutions, which sparked stiff competition in the sector (CBK, 2018). Still and in the era of a borderless digital revolution banking business model changed, where persons interact with each other freely and using a social platform to make payments and deliver faster services using an inexpensive alternative channel to the traditional banking system (WB, 2018).

The study opted for commercial banks as the unit of analysis because of data availability, well-demarcated revenue activities, highly regulated sector, and standardized reporting format of the financial statements. Banks in Kenya do self-report the annual performance

to CBK bi-annually using a standardized format and as such, the reporting is uniform in the presentation. More so, banks are few in numbers and small in size, under a single regulatory framework and provide similar products and services. Therefore, a census approach deemed as the most appropriate and helpful in undertaking the current research to minimize errors often associated with sampling size and homogeneity of products (Bryman & Bell, 2007).

3.5 Data Collection

This study used secondary panel data, a combination of both temporal (time-series) and spatial (cross-sectional) data dimensions. It is important to note that all active banks in Kenya report the audited financial performance to CBK for validation and approval. It is a regulatory requirement for each bank to publish the approved audited annual results in at least one of Kenya's national dailies latest by 31st March of the succeeding year. CBK on the other hand consolidates the financial data for all banks, publish it in its banking supervision annual report, and make it available for public scrutiny and consumption free of charge. The study favoured the use of secondary data because of availability and free for public scrutiny and consumption. Secondary data has a pre-established degree of validity and reliability, which imply that does not require re-examination by the researcher in case of re-use of such data (Cooper & Schindler, 2011). Also, it is time-saving and cost-efficient considering that the data was collated and compiled by the regulator as the third party, which makes it unbiased and as such increases reliability as well as validity. Similarly, other advantages of secondary quantitative data include unobtrusiveness, economical and usage of a wide range of statistical tests without limiting the use of specific statistics (Bryman & Bell, 2007).

The consolidated published financial statement for banks contains noticeable three sections: balance sheet, profit and loss account, and financial performance ratios. The balance sheet displays banks' assets, liabilities and shareholders' funds; the profit and loss account shows the banks' income and expense activities and other components, and financial performance ratios show some banks critical ratios essential for appraising banks health and soundness. The study extracted the panel data from the CBK banking supervision annual reports using a data capture form (Appendix I, Table A_1) stretching from 2009 to 2018 and converted using Microsoft Excel format (Appendix II, Table A_2) for more comfortable data arrangements. The data capture form tabulated the historical data relating to the attributes that measured revenue diversification, technical efficiency, size and financial performance.

This study used panel data combining both temporal and spatial data dimensions. This means that the panel regression assumed cross-section heterogeneity and period heterogeneity across the sampled banks. Time-series and cross-section studies that do not control for this heterogeneity run the risk of obtaining biased results (Bryman & Bell, 2007). A panel data analysis, therefore, achieves better regression results because it allows for control of the unobserved heterogeneity. Besides, panel data combines the cross-sectional and time-series dimensions, which ultimately reduces the biases of the statistical estimators while providing a ground for data triangulation (Kothari, 2010). That is a collection of data at different times and from a different source and compared to increase confidence. Further, panel data generates a larger sample yielding more degrees of freedom, more variability, more information and less multicollinearity among the variables.

3.6 Panel Data Model Specifications

The empirical analysis of this study was based on the panel least square regression assumptions. Panel data inherits both the cross-sectional and time-series data problems and as such, the model adequacy tests became important to enhance the reliability and validity of the regression coefficients and interpretations thereafter (Hoffmann, 2011).

3.6.1 Model Specification Suitability

Panel data estimations depend on the assumptions of the intercept, the slope coefficients, and the error term. Based on these assumptions, three forms of regression models are commonly used: the constant coefficients (or pooled regression) models, the fixed-effects models, and the random-effects models (Gujarati & Porter, 2009). These models are based on different assumptions, for instance, the constant coefficient ignores both time-series and cross-sectional effects, making it inappropriate for modelling panel data. This implies that the error terms are taken as zero $\mathcal{E}(u_i = 0)$ and as such, panel least squares produces efficient and consistent parameter estimates based on the equation model as represented by equation 3.1.

$$y = \alpha + \beta x + \mathcal{E}\ (u = 0) \quad \ldots\ldots(3.1)$$

Where: y is the dependent variable, x is a vector of independent variables, β is the regression coefficients, $\mathcal{E}$ is the disturbances, and u is the individual effect.

The random-effect model (REM) recognises both time-series and cross-sectional data and assumes that the individual-specific effects (u) are uncorrelated with the independent variables. REM requires strict exogenous and synonymous with the generalized least squares (GLS) framework. In other words, some of the dispersion reflects real differences in size effect across studies and that individual firm differences are random than fixed.

The model takes the individual effect (u_i) as part of the error term (ε_{it}) as represented by equation 3.2.

$$y_{it} = \alpha + \beta x_{it} + v\,(u_i + \varepsilon_{it}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.2)$$

Where: y_{it} is the dependent variable for entity *i* at time *t*, *x* is a vector of independent variables, β is the regression coefficients, and v error components of time variance and individual effect.

Fixed-effects model (FEM) recognises both time-series and cross-section data and assumes that all dispersion in the observed effects is due to sampling error and the intercept parameter captures the effect of the individual difference. The fixed-effect model relaxes the random effect assumption to allow for an arbitrary correlation between the unobserved effect and the observed explanatory variables. This model consistently estimates partial effect in presence of time-invariant (time-constant) omitted variables, making the fixed effect more robust than the random effect model. In other words, whether regressor (x_{it}) and error component (α_i) correlate or not, the fixed-effects model is consistent as represented in equation 3.3.

$$y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.3)$$

Where: y_{it} is the dependent variable for entity *i* at time *t*, *x* is a vector of independent variables, β is the regression coefficients, and ε_{it} error term.

However, panel data inherits problems associated with both the cross-sectional and time-series and any model that does not address the problems produces inconsistent, inefficient and spurious results (Wooldridge, 2001). That is, the essence of using panel data is to allow for unobserved effects to arbitrary correlate with the independent variables, which the fixed-effect model achieves explicitly, but subject to the Hausman (1978) test, serial correlation and heterogeneity diagnostic tests.

3.6.2 Outliers Assessment

Outliers are observations recorded which are extremely small or excessively large, and located far away from the majority of other observation and sometimes distorts inferential statistics (Cousineau & Chartier, 2010). Outliers could emerge from measurement errors, data structure or just any chance occurrence (Chawsheen & Latif, 2006). Failure to trace and treat the influential outliers could lead to model misspecification, biased parameter estimation or incorrect results. There are several ways of detecting outliers among them visual detection, standardized residuals, different fits, frequency distribution, interquartile range and box-whisker plots (Cousineau & Chartier, 2010). This study adopted the interquartile range (IQR) because of its insensitivity to outliers and mostly applicable to continuous variables with a unimodal probability distribution. In the case of influential outliers, the treatment methods would include data transformation, deletion or accommodation of the influential outliers.

3.6.3 Panel Data Stability

In data analysis, inferential statistics quality control becomes vital for viable interpretation of output and validity (Gujarati & Porter, 2009). This study examined whether the model parameters were stable across the data to ensure constancy, stability and robustness of the estimated relationship. Therefore, the model for coefficients stability and structural breaks assessment was important and there are several ways of assessing data stability including Chow's breakpoint test, Quandt-Andrews Breakpoint Test, Chow's Forecast Test, Ramsey's RESET Test, and Recursive Least Squares. Among the highlighted test, only the recursive least square is suitable for ordinary least square assumption and as such, the study adopted.

The recursive residuals cumulative sum (CUSUM) test plots the cumulative sum together with the 5% critical lines. The test finds parameters unstable if the cumulative sum goes outside the area between the two critical lines. Misspecification analysis using CUSUM as a stability technique monitors the change detection to facilitate a corrective measure. This entails computing for a statistic called CUSUM for each time under the null hypothesis that the statistics were drawn from a distribution called the CUSUM distribution. If for instance, the calculated CUSUM statistics appear not drawn from the CUSUM distribution, the study rejects the null hypothesis of model stability and the study could transform the data to attain stability.

3.6.4 Data Stationarity and Cointegration Order

Panel least square regression assumes data series stationarity at the level; otherwise, the estimation of inferential statistics becomes inconsistent, inefficient or spurious if the variables do not integrate (Gujarati & Porter, 2009). Put it differently, if a unit root test is present in a dataset, it implies that data is not stationary and as such, a study could further tests for the integration order to inform on the degree of integration required for the panel data to attain stationarity. Therefore, this study had to assess the series stationarity before performing regression analysis and other procedures. A panel data series becomes stationary — weakly or covariance— only when the mean and auto-covariance do not depend on time. That is, the order of integration of each of the series has to be zero-order $I(0)$ or otherwise differenced $I(d)$, where d represents the number of differentiation times taken on non-stationary panel data to attain stationarity. A unit root test evaluates the stability or predictability of time-series, and in a case where a series has a unit root; it implies data could be unstable or unpredictable series, which adversely affect the prediction or forecasting validity.

The unit root assessment relates closely to the concept of integration, where a variable set is considered integrated with the order of *1*(*d*) if, for example, it becomes stationary after differentiating *d* times (Engle & Granger, 1987). Nonintegrated variables make regression results unstandardized and spurious. If in the end, two or more variables move carefully together, the difference between them becomes a constant and forms a co-integrated equation, which defines a long-run equilibrium association. A lack of co-integration suggests that such variables have no long-run relationship and wanders randomly far away from each other (Dickey & Fuller, 1981). A differentiated stationary series is integrated *I(d)* with *d* as the order of the integration.

To put into the context, consider a hypothetical autoregressive process for panel data, $y_{it} = \rho_i y_{it-1} + x_{it}\,\delta_i + \epsilon_{it.}$ Where: *i* is the cross-section units observed over periods *t*, x_{it} is the vector of exogenous variables, ρ_i is the autoregressive coefficient and ϵ_{it} is the idiosyncratic disturbance. If the absolute autoregressive coefficient is less than a unit ($|\rho_i| < 1$), then the unit root is absent and as such, y_i is stationary at level, while if it equals a unit ($|\rho_i| = 1$), then the unit root is present and as such, y_i is non-stationary at a level. In a panel, there are two assumptions of ρ_i; the persistence parameters are common across cross-sections so that $\rho i = \rho$ for all *i* or vary freely across cross-sections. The null hypothesis represented by H_0: $\alpha = 0$ there is a unit root in the series, while the alternative hypothesis represented by H_1: $\alpha < 0$ there is no unit in the series.

The literature reviewed suggests that panel-based unit root tests have higher power than unit root tests based on individual time series. Thus, this study used Levin, Lin and Chu (2002) that assume a common unit root process for each variable and Augmented Dickey-Fuller (ADF) that assumes an individual unit root process for the variables. Thus, a unit-roots assessment was necessary in the current study in order to establish the number of

times the time series variable data was to be differentiated to achieve stationarity. If the unit root test is present in data, it implies that data is not stationary and a study further tests for the integration order to inform on the degree of integration required data to attain stationarity. In case of the presence of unit root, the study would perform integration-order tests to inform on the number of differences times on non-stationary panel data to attain stationarity.

3.6.5 Lag Length Selection Criteria

Lag length selection involves the determination optimum number of lags necessary before estimation using econometric models to ensure efficiency and consistency of results. This is because more lags consume the degree of freedom as well as reducing the power of the test statistics. Similarly, too few lags introduce the problems of correlation and multicollinearity, and as such, more than often lead to rejection of the null hypothesis when it is true (Gujarati & Porter, 2009). Therefore the appropriate lag length selection reduces the chances of committing both types I and types II errors drastically. Thus, a study conducts lag length selection to get the maximum number of lags for each variable. There are several criteria for selecting the lag lengths for the model: Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan Quinn Information Criterion (HQIC) among others. Any of these with the smallest estimates selected minimizes the residual sum of squares and avoid loss of degrees of freedom.

3.7 Panel Data Diagnostics Tests

In data analysis, a study has to maintain the panel data regression models assumptions to ensure reliability and validity in the estimation of coefficients and inferences statistics (Hoffmann, 2011). The panel least square robust and relevant tests include linearity, normality, multicollinearity, serial correlation, and heteroscedasticity.

3.7.1 Multivariate Normality Test

Normality is one of the panel least square basic requirements that assume that error terms have asymmetric distribution or centered at zero. Besides, the construction of confidence interval estimates such as the Chi-square (χ^2), Z-test, t-test and F-statistics assume data normality (Rawlings et al., 2001). Non-normality is a violation of this requirement that could lead to flawed hypothesis tests results associated with the exaggerated test statistics and often occurs when the data distribution is not bell-shaped. There are various tests for normality including Kolmogorov-Smirnov, histogram plots, Jarque-Bera, Shapiro-Wilk, Skewness, Kurtosis, Anderson-Darling and Pearson's Chi-square tests among others.

This study used the goodness-of-fit test, Kolmogorov-Smirnov (K-S) and histogram plots to assess the data normality. Kolmogorov (1933) and Smirnov (1948) pioneered K-S as a normality test for empirical distribution. The normality tests evaluate the maximum difference between the observed distribution and the expected cumulative-normal distribution. K-S uses the mean and the standard deviation of a sample to compute the expected normal distribution and means, that is, the Lilliefors' adjustment and the smaller the maximum difference, the closer the distribution to the normal. If the assumption were to fail, the study would perform data transformations in a case where data was not normally distributed, exclude the influential outliers to fix the problem or centre the variable data by deducting the values from the mean value.

3.7.2 Multivariate Linearity Test

Panel least square regression assumes model linearity in the parameters or regression coefficients and occurs when the association between the regressed and the regressor variables follows a straight line (Gujarati & Porter, 2009). That is, the parameter (β), the individual effect (α) and the error term (ε) becomes distributed normally with the mean

zero and variance (i.e., $\varepsilon_{it} \approx N(0, \sigma^2_{\varepsilon})$, where $0 < \sigma^2_{\varepsilon} < \infty$). The robust tests for linearity become vital since the panel least squares regression model assume data linearity (Cohen et al., 2003). There are various assessment methods for linearity including graphical, curve fitting with R-squared difference tests, Ramsey's RESET test, and analysis of variance (ANOVA) with Eta test.

This study used ANOVA with Eta-squared (η^2) to assess the linearity assumption. ANOVA generates both linearity and nonlinearity of the paired variables, and as such, the significance of F-statistics desired for linearity and insignificance of F-statistics for non-linearity. Eta is a correlation ratio that measures the strength of relationship based on the sums of squares computed in the analysis of variance and shows the proportion of variance associated with or accounted for by each of the main effects, errors and interactions in ANOVA. If data achieves linearity assumption, then the influence of exogenous variables on the endogenous variables remains constant across the model such that the effect on the regressed (y_{it}) of a unit change in regressor (x_{it}**)** does not depend on the value of one or more exogenous variables. If the study detects non-linearity in data, it would mean violation of the linearity doctrine since the current data characteristics are continuous and exhibit positive, negative and zeros values. The remedy perhaps would be data transformation by cube or square root to achieve desired linearity outcome.

3.7.3 Multicollinearity Test

Multicollinearity problem occurs in panel least square regression when the regressors inter-correlate highly with each other, and as such makes, it possible to predict with precision from each other variable (Hair et al. 2014). Collinearity causes large variation, which makes precise estimation difficult and consequently, inflates the confidence intervals, causes insignificance of *t* values, reports high R-squared and standard errors

values, and becomes too sensitive to trivial changes in the data. These misspecifications make the isolation of individual regressor effect on regressand difficult. Besides, collinearity affects the relative strengths of the explanatory variables and makes the joint effect statistics unreliable, and therefore the regression model cannot accurately predict the dependent variable or rather generate muddled results with higher error terms for each coefficient. There are many ways to assess multicollinearity including scatterplot, variance inflator factor (VIF) and tolerance (TOL), Eigenvalues and condition index etc.

This study used the aforementioned three statistical tests to detect the presence of multicollinearity. The inverse of variance inflator factor is the tolerance (TOL = I / (1-R^2) and the higher the VIF, the higher the R^2, which means that the regressors (x_{it}) inter-correlates. If all variables were statistically independent (orthogonal), then R^2 becomes zero, resulting in a VIF of a unit. VIF measures regression variance inflation due to collinearity and a coefficient higher than four (VIF > 4) or tolerance less than fourth (TOL < 0.25) becomes problematic. In the case of multicollinearity problem, the study would minimize the variance inflation (or means square error minimization) through the increase of the sample size, omission, merger or use of a composite index, mean-centred and or re-specify the model (Gujarati & Porter, 2009).

3.7.4 Serial Correlation Test

Serial correlation affects time series data and occurs when covariance between error terms is not zero (cov (ε_i, ε_j) = 0, for $i \neq j$) or follows an autocorrelated pattern. If a data has no serial correlation, it means that an error term of an individual observation cannot influence the error term relating to another observation. However, the presence of autocorrelation implies variables are dependent on each other, a violation of the ordinary least square assumption for robustness, and leads to the generation of smaller standard

errors and hence inaccurate hypothesis tests results. There are several ways of assessing serial correlation among Durbin-Watson (1950), Correlogram-Q-Statistics, Breusch-Godfrey (1978) Lagrange Multiplier (LM) among others.

This study adopted Breusch-Godfrey LM, a studentized residual with the null hypothesis (H_0) of no serial correlation among study variables. The study would reject if the p-values were statistically significant, otherwise, fail to reject if the p-values were statistically insignificant. In other words, if both the observed R-squared and F-statistic p-values become less than .05, means that the model contains serial correlation while p-values above .05 imply the model does not contain serial correlation. In case of serial correlation problems, the study would standardize the panel data and adopt the weighted least square models such as general least square (GLS) or general moment methods (GMM).

3.7.5 Heteroscedasticity Test

Heteroscedasticity implies that the model constant and slope coefficients vary across individuals while homoscedasticity implies constant and slope coefficients do not vary across individuals (Green, 2015). Under the ordinary least square assumptions, the variance of the linear model needs to be constant (homoscedastic) for the linear regression model to hold. That is, in a case where the error terms variations are not constant, it implies that they are heteroscedastic. The homoscedasticity assumption states that the population metric variance must be equal for all groups (literally, same variation). Therefore, in the case of heteroscedasticity absence, homoscedasticity prevails, which describes a situation in which the error term is constant. That is, the noise or random disturbance existing between the independent and the dependent variables is the same across all values of the independent variables. In other words, the variance of the error

term is constant and known. There are several tests for heteroscedasticity amongst mostly used are White test and Breusch-Pagan-Godfrey Lagrange Multiplier (LM) tests.

The study adopted Breusch-Pagan (1979) test to assess the presence of heteroscedasticity in the panel data because of its sensitivity to normality assumption, unlike the extreme White test. The null hypothesis is that the error terms are homoscedastic against the alternative of heteroscedasticity and the insignificant outcome is desired. That is the observed R-squared value of more than .05 implies the absence of heteroscedasticity. Importantly, when a study achieves the homoscedasticity assumption, the chances for making Type I & II errors drastically reduce and improves the accuracy of the research findings. In case of the presence of heteroscedasticity, the study would standardize the panel data and use the weighted least square models such as general least square (GLS) or general moment methods (GMM).

3.8 Operationalization and Measurement of Variables

Operationalization is a process of allocating symbols to various variables in order to allow for measurability (Sekaran, 2010). In this study, the dependent variable was financial performance and the independent variable was revenue diversification mediated and moderated by technical efficiency and size, respectively.

3.8.1 Operationalization and Measurement of Financial Performance

Financial performance refers to the bank's objectives achievement expressed in terms of profitability (Rozzani & Rahman, 2013). This study modelled financial performance as the dependent variable represented by the profitability index, return on assets (RoA). RoA measures the overall effectiveness of a commercial bank in utilizing useful assets, and a widely used financial performance measure perceived to satisfy the interest of

almost all stakeholders. The nature of banking operations makes banks have many assets, which imply that banks are highly leveraged financially and thus, RoA for banks would generally be low (Almazari, 2014). The study proxied RoA via earnings before interest and tax (EBIT) over the total assets (TA) as shown in equation 3.4.

$$\text{RoA} = \frac{\text{EBIT}}{\text{TA}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.4)$$

Several previous studies have adopted the model (Almazari, 2014; Olusegun et al., 2013; and Rozzani & Rahman, 2013). The RoA results were as presented in Appendix II, Table A_2 column named RoA.

3.8.2 Operationalization and Measurement of Revenue Diversification

Revenue diversification refers to the bank's ability to generate gross earnings from multiple sources (Stiroh, 2004). This study modelled revenue diversification as the independent variable, decomposed into interest and non-interest diversification, and measured using the Herfindahl-Hirschman index (HHI) as was shown in equation 3.5.

$$\text{HHI} = \sum_{i=1}^{n} \left(\frac{xi}{Q}\right)^2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.5)$$

Where: $Q = \sum_{i=1}^{n} xi + \cdots . + xn$ is the total revenue exposure, $\sum$ is the sum, and x_i is the exposure variable. HHI is a sum-up of weighted squared exposure as a percentage of total exposure and ranges from zero to a unit ($0 < HHI < 1$). A higher level of the index reflects concentration while a lower value reflects diversification. However, for ease of understanding and interpretation of the results, this study used a reversed index (1-HHI) so that the higher the index the higher the diversification level. Several authors have applied previously the reversed diversification (Tran et al., 2020; Githaiga et al., 2019; Natalia et al., 2016; and Gambacorta et al., 2014). The results were as presented in Appendix II, Table A_2, in the columns named HHI_{II} and HHI_{NII}.

3.8.3 Operationalization and Measurement of Technical Efficiency

Technical efficiency refers to a bank's ability to produce maximum outputs from the least input combination (Koopmans, 1951). This study modelled technical efficiency as a mediator and based on the intermediation specification, this study used three inputs and two outputs and the estimated ratio of outputs to inputs yielded the technical efficiency score represented by the theta (θ) for each bank as was shown in equation 3.6.

$$\text{Min}_{\theta\lambda}\ \theta \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.6)$$

$$s.t\ -y_i + Y\lambda \geq 0'$$

$$\theta x_i - X\lambda \geq 0',\ \ \lambda \geq 0$$

Where: θ is the technical efficiency score for the i^{th} bank, λ is a column matrix Nx1, a vector of constraints. A bank with θ = 1 input-output mix lies on the efficient frontier and indicate a technically efficient bank (benchmark bank) while a bank with θ < 1 input-output mix lies below the efficient frontier and needs a 1- θ reduction in the input level to reach the efficient frontier. Various authors have used DEA to measure technical efficiency (Desheng et al., 2019; Sharma, 2018; Nguyen, 2017; and Khan et al., 2016). The DEA results were as presented in Appendix II table A_2, column named TE.

3.8.4 Operationalization and Measurement of Size

Size refers to the unique features that describe the magnitude of a firm (Golan et al., 2003). This study conceptualized bank size as a moderator and used a weighted composite index of assets, capital and reserve, deposits and number of loan and deposit accounts. That is a sum of the equal-weighted index as was shown in equation 3.7.

$$\text{Size} = [33\%\ (\text{assets} + \text{deposits} + \text{capital}) + 0.5\ \%(\ \text{loan} + \text{deposits accounts})] \ldots(3.7)$$

The size composite index results were as provided in Appendix II, Table A_2, in a column named 'S'. The summary table of operationalization was as shown in Table 3.2.

Table 3.2: Summary Table of operationalization and measurement of variables				
Variables	**Indicators**	**Operational Definitions**	**Measurements Ratios**	**References**
Dependent Financial performance	**Return on Assets (RoA)** — Earnings before Interest & Tax — Total Assets (*TA*)	Bank's profitability relative to its assets	$RoA = \frac{EBIT}{Total\ Assets}$	(Almazari, 2014; Olusegun et al., 2013; Rozzani & Rahman, 2013; and Goddard et al., 2011)
Independent Interest income	**Interest Diversification (HHI_{II})** —Loans & Advances, —Government Securities, —Deposits Placements, —Other Interest Income	Banks' ability to generate gross earnings from multiple sources	**Herfindahl-Hirschman Index:** $HHI = 1 - \sum_{i=1}^{n} \left(\frac{xi}{Q}\right)^2$	(Tran et al., 2020; Githaiga et al., 2019; Natalia et al., 2016; Gambacorta et al., 2014; DeYoung & Torna, 2013; Kiweu, 2012; and Sanya & Wolfe, 2011)
Independent None-Interest Income	**Non-interest diversification (HHI_{NII})** —Fees & Commission on Loans & Advances, —Other Fees & Commission, —Foreign Exchange Trading, —Dividend Income, —Other Non-Interest			
Mediator Technical Efficiency	**Weighted Composite index** —**Inputs** (Deposits, Capital & Labour) —**Outputs** (Loans & Investments)	Bank's ability to generate optimal outputs from least input combination	**DEA index** $TE = \frac{Weighted\ Output}{Weighted\ Input}$	(Izzeldin et al., 2020; Adesanya & Abere, 2020; Desheng et al., 2019; Sharma, 2018; Nguyen, 2017; and Khan et al., 2016)
Moderator Size	**Weighted Composite index** Assets, Capital, deposits, number of loans and Deposits accounts	Bank's unique features describing sensitivity to the banking system and peer group	Weighted composite index Size = 33% (Assets, deposits & capital) +0.5% (N^0 of loan & deposit a/c)	(Aw-waliyah, 2018; Laeven et al., 2016; and Evgeni, 2012)

Sources: Literature Review, 2021

3.9 Data Analysis and Presentation

Data analysis is the process of scrutinizing, transforming and modelling data to ascertain the usefulness of information that supports decision-making. The application of descriptive and inferential statistical procedures enriches the understanding of the gathered data consistency (Zikmund et al., 2013). The current study inclined toward positivism philosophical orientation and therefore was imperative to use both descriptive and inferential statistics. The analysis utilized an unbalanced panel combining both cross-sectional and time-series data dimensions. The data was collected from across commercial banks over a ten (10) year period (2009-2018) that generated four-hundred- twenty (420) data points and analyzed using the panel least square fixed-effect model.

In order to visualize the data collected and make a meaningful presentation, the study generated descriptive statistics for each variable. These include Maximum and Minimum, Mean and Standard Deviation, Skewness and Kurtosis. Mean is the central tendency measure of the most indicative number in a set of numbers while the standard deviation shows values dispersion from the mean value. Skewness measures data symmetry or lack of it and ranges from ±2. Kurtosis indicates the tails of distribution away from the normal distribution and ranges from ±3 (Gujarati & Porter, 2009). These descriptive statistics were important in identifying any unusual information that would have required a specific treatment of the data model before the adoption of the inferential statistic for a robust prediction.

Correlation analysis guided on the magnitude of the relationships between variables, which assisted in choosing a suitable regression model, and required treatment on the data in case of multicollinearity (Gujarati & Porter, 2009). This study adopted the widely used Karl Pearson product-moment correlation for assessing linear relationships between variables

in continuous data. Further, all variables were in metric and as such, the correlation results were reported using Pearson (r) coefficient at a significance level of .05 and .01, consistent with earlier scholarly studies (Sekaran, 2010). Pearson correlation 'r' ranges from a negative unit to a positive unit (± 1), where if r = 1, shows a perfect correlation such that as a variable increases the other variable increases proportionately and vice-versa, while r = 0, shows no relationship at all. The absolute |r| value of a coefficient degree greater than |0.8| considered high, between |0.8| and |0.5| is moderate, at least |0.3| is low and no association when the absolute value |0| is zero.

In the estimation of inferential statistics, the most applied panel estimation methods in social science include ordinary (panel) least squares (OLS), maximum likelihood (ML), and the generalized method of moments (GMM) (Wooldridge, 2001). Panel least-square assumes that data has zero error term mean and that the error term does not correlate with the independent variables, homoscedasticity, no perfect linearity, and no serial correlation between variables. If the first OLS assumption is violated then Generalized least squares (GLS) could be used, which require stronger assumptions than system OLS to be consistent. The panel least square model contains a constant and the individual variable coefficient, standard error (S.E), t-statistics and probability values. The effect specification contains R-squared (R^2), adjusted R-squared ($\bar{R}^2$) and standard error of estimate, F-statistics and Durbin-Watson (d) statistics among others. However, R^2 is inefficient as it ever increases with an increase in data points irrespective of the values of the predictive model. The study address this weakness using the adjusted R-squared ($\bar{R}^2$) coefficient, which considers the value added to the model predictive ability with the addition of data points and increases only if the additional data points improve the predictive regression more than expected by chance and always lower than the R-squared.

3.9.1 Revenue Diversification and Financial Performance

A panel least square regression assessed the direct relationship between revenue diversification and financial performance. This was based on the assumption that revenue diversification could explain explicitly the financial performance of commercial banks. Revenue diversification components consisted of interest diversification (HHI_{II}) and non-interest income (HHI_{NII}) while financial performance was represented by returns on assets (RoA). The decomposition of revenue diversification components was to delineate the effect of each component on the dependent variable.

The first objective was to determine the effect of revenue diversification on financial performance of commercial banks in Kenya. This was decomposed into the following two sub-null hypotheses:

H_{11}**:** Interest diversification does not significantly affect returns on assets.

H_{12}: Non-interest diversification does not significantly affect returns on assets.

In order to increase the analysis precision, the perceived relationship between return on assets and both interest diversification and non-interest diversification were as stated in Equations 3.8_a and 3.8_b, respectively.

$$RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.8_a)$$

$$RoA_{it} = \beta_0 + \beta_1 (HHI_{NII})_{it} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.8_b)$$

Where: RoA_{it} is the predicted returns on assets, representing the dependent variable for bank *i* at time *t*. β_0 is the regression constant, β_1 is the regression coefficients, HHI_{II} is the interest diversification index, representing the independent variable for bank *i* at time *t*. HHI_{NII} is a non-interest diversification index, representing the independent variable for bank *i* at time *t*, and ε_{it} is the error term for bank *i* at time *t*.

3.9.2 Revenue Diversification, Technical Efficiency and Financial Performance

The second objective was to assess the mediation effect of technical efficiency on the relationship between revenue diversification and financial performance. The study modelled technical efficiency as a mediator, a third variable that transmits the effects of the independent variable to the dependent variable (MacKinnon et al., 2002). The study adopted Baron and Kennys' four-step regression model to assess the mediation effect of technical efficiency. The assessment criteria suggest that the independent variable must significantly relate to the dependent variable as the first condition. Secondly, the independent variable must significantly relate to the mediator variable. Thirdly, the mediator variable must significantly relate to the dependent, and finally, when the mediation effect is controlled, the independent variable effect on the dependent no longer holds for a full mediation. Alternatively, a partial mediation occurs when the effect remains significant with evidence of a noticeable and material change in the relationship. This study adopted the Baron and Kenny (1986) s' four consecutive steps as follows:

In the first step, the study performed a panel least square regressions analysis to assess the existence of a relationship between returns and assets on both interest diversification (HHI_{II}) and noninterest diversification (HHI_{NII}), while controlling for technical efficiency effect in the model and each case as shown in equation 3.9_a and 3.9_b, respectively.

$$RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \varepsilon_{it} \quad (3.9_a)$$

$$RoA_{it} = \beta_0 + \beta_1(HHI_{NII})_{it} + \varepsilon_{it} \quad (3.9_b)$$

Where: RoA_{it} is the predicted return on assets, representing the dependent variable, β_0 is the regression constant, β_1 is the regression coefficients, HHI_{II} interest diversification representing the independent variable, and HHI_{NII} is non-interest diversification representing the independent variable, and ε_{it} is the error term.

In the second step, the study used panel least regression analysis to assess the existence of a relationship between technical efficiency on both interest diversification and non-interest diversification as was shown in Equations 3.10_a and 3.10_b, respectively.

$$TE_{it} = \beta_0 + \beta_1 (HHI_{II})_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.10_a)$$

$$TE_{it} = \beta_0 + \beta_1 (HHI_{NII})_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.10_b)$$

Where: TE_{it} is the predicted technical efficiency representing the mediator variable, β_0 is the regression constant, β_1 is the regression coefficient, HHI_{II} is interest diversification, HHI_{NII} is non-interest diversification, and ε_{it} is the error term. In the third step, the study performed a panel least square regression analysis to assess the existence of a relationship between returns on assets and technical efficiency as shown in equation 3.11.

$$RoA_{it} = \beta_0 + \beta_1 (TE)_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots \quad (3.11)$$

Where: RoA_{it} is the return on assets, representing the dependent variable, β_0 is the regression constant, β_1 is regression coefficients, TE_{it} is the technical efficiency, representing mediator, and ε_{it} is the error term.

The fourth step would depend on the verdict of steps 1-3, and if significant relationships existed in all cases, then mediation would be possible. Finally, the last step to assess the effect of both interest diversification and non-interest diversification on return on assets, in presence of technical efficiency was as shown in Equations 3.12_a and 3.12_b, respectively.

$$RoA_{it} = \beta_0 + \beta_1 (HHI_{II})_{it} + \beta_2 (TE)_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots \quad (3.12_a)$$

$$RoA_{it} = \beta_0 + \beta_1 (HHI_{NII})_{it} + \beta_2 (TE)_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots \quad (3.12_b)$$

Where: RoA_{it} is the return on assets, representing the dependent variable, β_0 is constant, β_1 and β_2 are regression coefficients, HHI_{II} is interest diversification, HHI_{NII} is non-interest diversification, TE_{it} is technical efficiency, representing mediating variable, and ε_{it} is the error term.

3.9.3 Revenue Diversification, Size and Financial Performance

The third objective was to assess the moderation effect of size on the relationship between revenue diversification and financial performance. The study conceptualized size as a moderator, a third variable that interacts with revenue diversification to influence return on assets. That is, the size moderation effect could enhance the relationship such that with an increase in size the revenue diversification effect on return on assets could increase. Alternatively, the size moderation could buffer the relationship such that with an increase in size, revenue diversification effects on the return on assets could decrease, and lastly, the size moderation effect could antagonize the relationship such that with an increase in size, the effect of revenue diversification on return on assets could reverse.

This study created the interaction term by standardization. The standardization process entailed the transformation of data into a standard normal distribution with a mean of zero and standards deviation of a unit (Cohen et al., 2003). That is the study generated and centered the data first, to generate a product of size and both interest and non-interest diversification in each case. The produced standardized data generated size and interest diversification interaction (HHI_{II}*S), and size and non-interest diversification interaction (HHI_{NII}*S). The assessment could support the moderation hypothesis only if the interactive term in the predicting model yields a statistically significant coefficient. The process was important to allow for a comparison of the bank size effects of different factors and interpretation of results thereof.

The study conducted panel least square regression to assess the size interaction effect on return on assets as shown in equation 3.13_a and 3.13_b representing size interaction with interest diversification and non-interest diversification, respectively.

$$RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \beta_2 (S)_{it} + \beta_3(HHI_{II}*S)_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.13_a)$$

$$RoA_{it} = \beta_0 + \beta_1(HHI_{NII})_{it} + \beta_2(S)_{it} + \beta_3(HHI_{NII}*S) + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.13_b)$$

Where: RoA_{it} is the predicted return on assets, representing the dependent variable. β_0 is the regression constant, β_1 is the regression coefficients, HHI_{II} is interest diversification, representing the independent variable. HHI_{NII} is non-interest diversification, representing the independent variable. S is size representing the moderating variable, β_3 is the interaction term coefficients, HHI_{II}*S is the size interaction with interest diversification, HHI_{NII}*S is the size interaction with non-interest diversification, and ε_{it} is the error term.

3.9.4 Revenue Diversification, Technical Efficiency, Size and Financial Performance

Finally, the fourth objective was to evaluate the joint effect of revenue diversification, technical efficiency and size on financial performance of commercial banks. The study conducted panel least square regression to assess the collective impact of the independent variables on financial performance as was shown in equation 3.14.

$$RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \beta_2 (HHI_{NII})_{it} + \beta_3(TE)_{it} + \beta_4(S)_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots \quad (3.14)$$

Where : RoA_{it}, is the return on assets representing the dependent variable, β_0 is the constant, β_1, β_2, β_3, and β_4 are regression coefficients, HHI_{II} is interest diversification denoting independent variable, HHI_{NII} is non-interest diversification denoting independent variable, TE_{it} is technical efficiency denoting mediating variable, S_{it} is size denoting moderating variable, and ε_{it} is an error term.

3.9.5 Summary of Objectives, Hypotheses, Model and Interpretations

The main objective of this study was to assess the relationships between revenue diversification (independent), technical efficiency (mediator), size (moderator) and financial performance (dependent) of commercial banks in Kenya. Table 3.3 provides a summary of the specific objectives, hypotheses, model and expected interpretations.

Table 3.3: Summary of specific Objectives, Hypotheses, Analytical Model, and Interpretation

Objectives	Null hypothesis	Analytical Model	Expected Interpretation of Results
1. Evaluate the effect of revenue diversification on financial performance of commercial banks in Kenya.	H_1: Revenue diversification does not significantly affect financial performance of commercial banks in Kenya.	- Panel least square regression analysis, - Correlation analysis - Herfindahl-Hirschman Index $RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \varepsilon_{it}$ $RoA_{it} = \beta_0 + \beta_1(HHI_{NII})_{it} + \varepsilon_{it}$	Significant β_1, Significance of F-Statistics Adjusted R-squared $\bar{R}^2$ ($\beta_1 \neq 0$, $p < .05$) reject H_1 ($\beta_1 \neq 0$, $p < .05$) fail to reject H_1
2. Assess the technical efficiency mediation effect on the relationship between revenue diversification and financial performance of commercial banks in Kenya.	H_2: Technical efficiency does not mediate the relationship between revenue diversification and financial performance of commercial banks in Kenya.	- Panel least square regression; - Data envelopment analysis - Baron & Kenny mediation model 1) $RoA_{it} = \beta_0 + \beta_1(HHI_{II+NII})_{it} + \varepsilon_{it}$ 2) $TE_{it} = \beta_0 + \beta_1 (HHI_{II+NII})_{it} + \varepsilon_{it}$ 3) $RoA_{it} = \beta_0 + \beta_1(TE)_{it} + \varepsilon_{it}$ 4) $RoA_{it} = \beta_0 + \beta_1(HHI_{II+NII})_{it} + \beta_2(TE)_{it} + \varepsilon_{it}$	Significance of β_1s in steps 1-3 Insignificance β_1 in step 4 Significance β_2 in step 4 Significance of F-statistics ($\beta s \neq 0$, $p <.05$) reject H_2, ($\beta s \neq 0$, $p >.05$)fail to reject H_2
3. Assess the size moderation effect on the relationship between revenue diversification and financial performance of commercial banks in Kenya	H_3: Size does not moderate the relationship between revenue diversification and financial performance of commercial banks in Kenya.	- Panel least square regression; - Baron & Kenny interaction model $RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \beta_2(S)_{it} + \beta_3(HHI_{II*}S)_{it} + \varepsilon_{it}$ $RoA_{it} = \beta_0 + \beta_1(HHI_{NII})it + \beta_2(S)_{it} + \beta_3(HHI_{NII*}S)_{it} + \varepsilon_{it}$	Significance of interactions β_3 Signiicance of F-statisics. ($\beta s \neq 0$, $p < .05$) reject H_3 ($\beta s \neq 0$, $p > .05$) fail to reject H_3
4. Evaluate the joint effect of revenue diversification, technical efficiency, and size on financial performance of commercial banks in Kenya.	H_4: Jointly revenue diversification, technical efficiency and size do not significantly affect financial performance of commercial banks in Kenya.	- Multiple Panel least square regression $RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \beta_1(HHI_{NII})_{it} + \beta_2(TE)_{it} + \beta_3(S)_{it} + \varepsilon_{it}$	Significance of all βs Significance of F-Statistics, Adjusted R-squared $\bar{R}^2$ ($\beta_s \neq 0$, $p < .05$) reject H_4 ($\beta_s \neq 0$, $p > .05$) fail to reject H_4

Source: Author, 2021

CHAPTER FOUR: DESCRIPTIVE ANALYSIS AND RESULTS

4.1 Introduction

This chapter describes the data capture rate, trend analysis, descriptive statistics, model specification and diagnostic tests, and correlation analysis.

4.2 Panel Data Capture Rate

This study targeted all registered banks in Kenya, spanning 31 December 2009 to 31 December 2018. The study collected unbalance panel data from all active commercial banks as shown in Table 4.1.

Table 4.1: Panel Data Capture Rate

Year	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	Obs
Targeted	43	43	43	43	44	44	44	44	44	46	**438**
Excluded	3	3	3	3	1	1	1	1	1	1	18
Collected	40	40	40	40	43	43	43	43	43	45	**420**

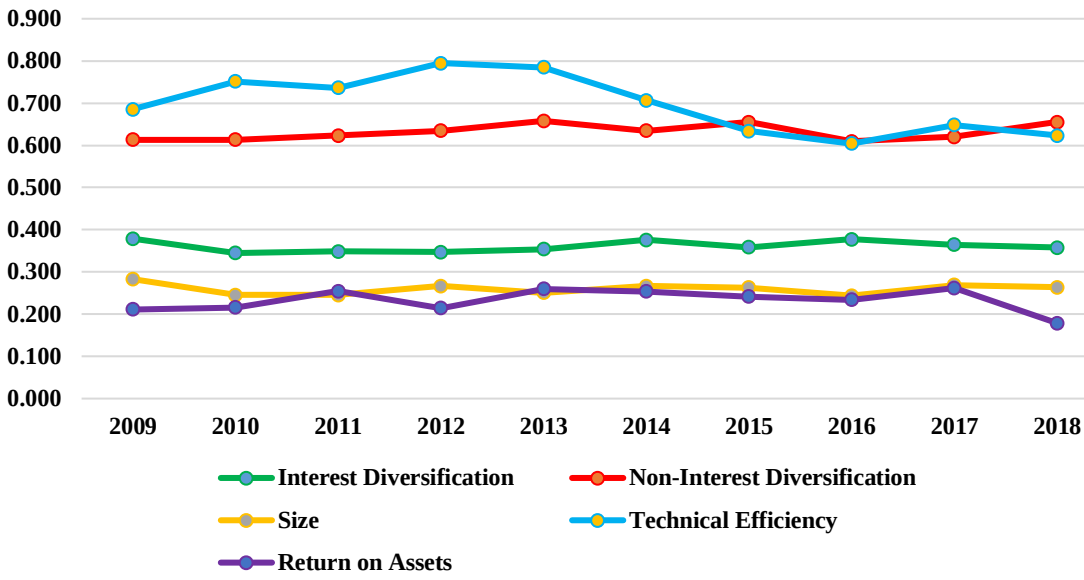
Sources: CBK database (2009-2018)

Table 4.1 reveals that, although the study targeted to collect data from all registered banks (438 data points) the study collected successfully 420 data points, representing a capture rate of 96 percent. The study excluded from analysis Charterhouse bank that was under statutory management from 2009 to 2018. Savings and Loans merged with KCB, City Finance and Southern Credit renamed Jamii Bora and Equatorial banks, respectively in 2010. Imperial and Chase banks were In-Receivership while Dubai bank was In-Liquidation in 2015. Fidelity, Habib and Giro banks were acquired by SMB, Diamond Trust and I&M banks respectively, while DIB and Mayfair banks were licenced in 2017. The success rate was high enough and considered adequate for analysis as guided by Singleton and Straits (2010) suggestions that a panel data capture rate of over 75 percent could be adequate for a panel data analysis.

4.3 Trend Analysis

To understand the general trend of banks in terms of revenue diversification, technical efficiency, size and financial performance over the study period, a graphical presentation was as shown in Figure 4.1.

Figure 4.1: Trend Analysis (in ratios)



Sources: Research Findings 2021

Figure 4.1 shows that during the study period, the variables data followed somehow a similar trend with an exception of technical efficiency, which appeared like an outlier, and more volatile despite a pullback in 2015. Notably, non-interest diversification and technical efficiency moved closely with each other and above all other variables. This gave an impression that technical efficiency somehow exhibited a sporadic movement, while all other variables smoothened. Further, Figure 4.1 depicts that between 2009 and 2010, size and interest diversification trended downwards while technical efficiency trended upward as non-interest diversification and return on assets remained constant. The trend analysis revealed that the four variables related in a way such that when non-interest diversification, interest diversification, size and technical efficiency increased, return on assets response lagged, a preview that all variables related positively.

Figure 4.1 shows a kind of banking inertia/shock split in two periods: the years between 2009 and 2011, and again between 2015 and 2018, which seemingly affected the movement of technical efficiency and return on assets more loudly. Experts associated the prior period to the spillover effect of the 2007/8 world financial crisis, the USA credit crash, Kenya's post-violence, and the massive adoption of technology, which perhaps interrupted the banking business model (KBA, 2019). The later interruption has been associated with the introduction and implementation of interest capping policy, euro-zone crisis and Kenya's 2017 contested and repeated electioneering periods (CBK, 2018). These seemingly forced banks to rebalance activities mix as a response to smoothen the banks' returns on assets. These affected the returns on assets and technical efficiency levels. However, this had slightly positive effects on the size of banks and revenue generation associated with the era of heightened banking consolidation, as a reaction.

4.4 Descriptive Statistic Analysis

In order to visualize the panel data, the study employed descriptive statistics aimed at making the presentations more meaningful and straightforward in the interpretations as were presented in Table 4.2.

Table 4.2: Descriptive Statistics Results

		Return on Assets	Interest Diversification	Non-Interest Diversification	Technical Efficiency	Size
N	Valid	420	420	420	420	420
	Missing	0	0	0	0	0
	Mean	2.03	.36	.63	.69	2.38
	Median	2.49	.36	.66	.73	.77
	Std. Deviation	3.76	.12	.12	.23	3.13
	Skewness	-3.25	-.15	-2.14	-.58	1.91
	Kurtosis	20.48	-.44	5.83	-.18	3.21
	Minimum	-32.15	.01	.06	.00	.07
	Maximum	10.40	.65	.77	1.00	14.52

Source: Research Findings 2021

Table 4.2 revealed that the mean statistics values for returns on assets, interest diversification, non-interest diversification, technical efficiency and size were 2.03 ± 3.76, .36 ± .12, .63 ± .12, .69 ± .23 and 2.4 ± 3.1 respectively. Notably, size and return on assets exhibited a standard deviation of 3.13 and 3.76 respectively, which revealed a higher data variability from the respective mean values that could be associated with a wider range of 42.15 and 14.45 respectively while other variables exhibited very low data variability from the respective mean scores. Further, except for size positive Skewness, other variables exhibited negative Skewness. Non-interest diversification and technical efficiency had negative Kurtosis while other variables displayed positive Kurtosis.

The descriptive statistics disclosed that diversification in non-interest (.63) almost doubled that of the interest income (.36), and both statistics were within the moderate diversification range of greater than 0.25 and less than 0.75. This implied that banks embraced revenue generation activities at different levels. That is banks complemented the traditional banking activities with non-traditional banking activities during the study period. This study provided evidence that on average, returns on assets was about 2 percent (2.03) per annum with the highest return of positive 10 percent (max = 10.4) and lowest return of negative 32 percent (min = -32.15). The higher variability in return on assets (3.76) showed that banks had different earning abilities on returns during the period. For instance, while Citi bank earned 10 percent (10.4) on its assets, DIB bank was worse-off by 32 percent (-32.2). This provided proof of heterogeneous earnings on assets across banks in Kenya, during the study period.

Technical efficiency divulged that on average, commercial banks were about 70 percent (.69) relatively efficient in the intermediation process. In other words, the output-input

relationship revealed a technical inefficiency (wastage) of 30 percent relatively. In other words, some banks were technically inefficient (min = .0, or 100 % wastage) while others were technically efficient (max = 1, or 100 % efficient). Finally, size (2.38) revealed that banks on aggregate were heterogeneous. Put it differently, on average banks' size was 2.4 percent with the smallest bank being 15 times the smaller bank (min=.07, max 14.52). This showed that Kenyan banks had different abilities in terms of banking operations, deposits mobilization, capital and market activities, loans creation, and the number of financial services offered to clients.

The positive skew exhibited by size (K=1.91) implied that the majority of the observations were to the left (or a long right-tailed distribution) of the mean values than expected in a normal distribution. This meant that the extreme data values were larger enough to increase the mean and as such, the mean (2.4) became greater than medians (.77) as witnessed in size. The negative skew implied that most of the observations to the right (or a long left-tailed distribution) of the mean values than expected in a normal distribution. This meant that the extreme values were very small to suppress the mean scores and as such, the median values became larger than the mean values as exhibited by all other the variables with exception of frim size. Lastly, return on assets (K = 20.5), noninterest diversification (K = 5.8) and size (K = 3.2) had excess positive Kurtosis of more than three (K > 3) while interest diversification (K = -.44) and technical efficiency (K = -.18) had negative Kurtosis of less than three (K < 3). The positive Kurtosis meant a peaked (leptokurtic) distribution relative to a normal distribution while the negative implied a platykurtic distribution corresponding to a normal distribution. These results indicated a small margin of excess Kurtosis from three variables apart from return on assets and non-interest diversification, which perhaps meant the presence of extreme outliers, but subjected to the assessment of outliers.

4.5 Outliers Assessment

This study adopted the interquartile range (IQR) to perform data quality checks for influential outliers. This guided on the extreme outliers or observations that were lying outside the first-quartile less three inter-quartile range (Q_1-3(IQR)) and the third quartile plus three inter-quartile range (Q_3+3(IQR)). The results were as presented in Table 4.3.

Table 4.3: Interquartile Range Test Results

Statistics		Return on assets	Interest diversification	Non-interest diversification	Technical efficiency	Size
	Minimum	-32.15	0.01	0.06	0.00	0.07
	Maximum	10.40	0.65	0.77	1.00	14.52
Percentiles	25	0.89	0.26	0.59	0.53	0.40
	50	2.49	0.36	0.66	0.73	0.77
	75	4.20	0.45	0.71	0.88	3.41
Interquartile	(IQR)	3.31	0.20	0.12	0.35	3.01
	3(IQR)	9.92	0.59	0.36	1.04	9.04
Lower (L) Q_1 -3(IQR)		-9.03	-.32	0.23	-0.51	-8.64
Upper (U)Q_3 +3(IQR)		14.12	1.04	1.07	1.92	12.45
Extreme low Outliers		6	0	7	0	0
Extreme high Outliers		0	0	0	0	9

Source: Research Findings 2021

Table 4.3 revealed that interest diversification and technical efficiency had no extreme low or high outliers. However, return on assets and non-interest diversification exhibited extreme low outliers of six (6) and seven (7) respectively, while size exhibited extreme high outliers of nine (9). These provided evidence of few extreme values that were not influential and as such, the outliers had a mild effect, which the study accommodated. Cousineau and Charter (2010) recommend accommodation of extreme values if possible to maintain the modelling, originality and interpretation of the results. Therefore, after assessment of the effect of the outliers, the study found the effect to be mild and as such, little or no effect of outliers on the interpretation of the inferential statistics.

4.6 Panel Data Model Specification Tests Results

The study performed model specification tests to ensure estimation coefficients reliability and validity. These include the Hausman tests for the model for the suitability, recursive least squares cumulative sum (CUSUM) test for data stability, Levin, Lin & Chu (LLC) and ADF for unit root tests, and Lag Length Selection Criteria.

4.6.1 Model Adequacy Tests Results

The choice of the estimation model often could address the panel dimensional challenges. This stud used the Hausman test to guide model suitability and adequacy. The null hypothesis stated that the random-effects model was appropriate with the alternative of fixed-effects. The decision criterion was to reject the hypothesis if the p-values were insignificant ($p > .05$), otherwise fail to reject if p-values were significant ($p < .05$). The Hausman test results were as presented in Table 4.4.

Table 4.4: Correlated Random Effects - Hausman Test

Dependent Variable: Return on Assets (ROA)
Method: Panel Least Squares
Sample: 2009 2018 : Periods included: 10: Total panel (unbalanced) observations: 420

Test cross-section random effects

Test Summary	**Chi-Sq. Statistic**	**d.f.**	**Prob.**
Cross-section random	2.092436	4	0.7188

Cross-section random effects test comparisons:

Variable	**Fixed**	**Random**	**Var(Diff.)**	**Prob.**
Interest Diversification (HHI_{II})	3.2569	3.218996	0.297467	0.9445
Non-interest Diversification (HHI_{NII})	2.5297	2.438865	0.084395	0.7543
Technical efficiency (TE)	1.1734	1.318775	0.018844	0.2898
Size (S)	0.5307	0.511937	0.001218	0.5902

R-squared	0.5242	Mean dependent var	2.030310
Adjusted R-squared	0.4626	S.D. dependent var	3.760565
S.E. of regression	2.7565	Akaike info criterion	4.975102
Sum squared resid	2819.02	Schwarz criterion	5.446465
Log likelihood	-995.77	Hannan-Quinn criterion	5.161406
F-statistic	8.5171	Durbin-Watson stat	1.469106
Prob(F-statistic)	0.0000		

Source: Research Findings 2021

Table 4.4 shows the Hausman test results, which indicated that the test summary of the cross-section random was statistically insignificant (N (4, 416) $\chi^2 = 2.09$, $p = .72$). In other words, the Chi-Square (χ^2) test statistics for cross-section random in the test summary were insignificant ($p > .05$). Based on the insignificance of the Hausman test results, the study rejected the hypothesis that the random-effects model was appropriate and adopted the fixed-effect model for analysis henceforth. The fixed-effect model was appropriate as it takes care of unobserved variables in tandem with the preference of panel data analysis.

4.6.2 Model Stability Test Results

This study used a visual examination of recursive least squares parameter estimates to evaluate the stability of the data model. The stability null hypothesis stated that the data not drawn from the CUSUM distribution. The test results were as shown in Figure 4.2.

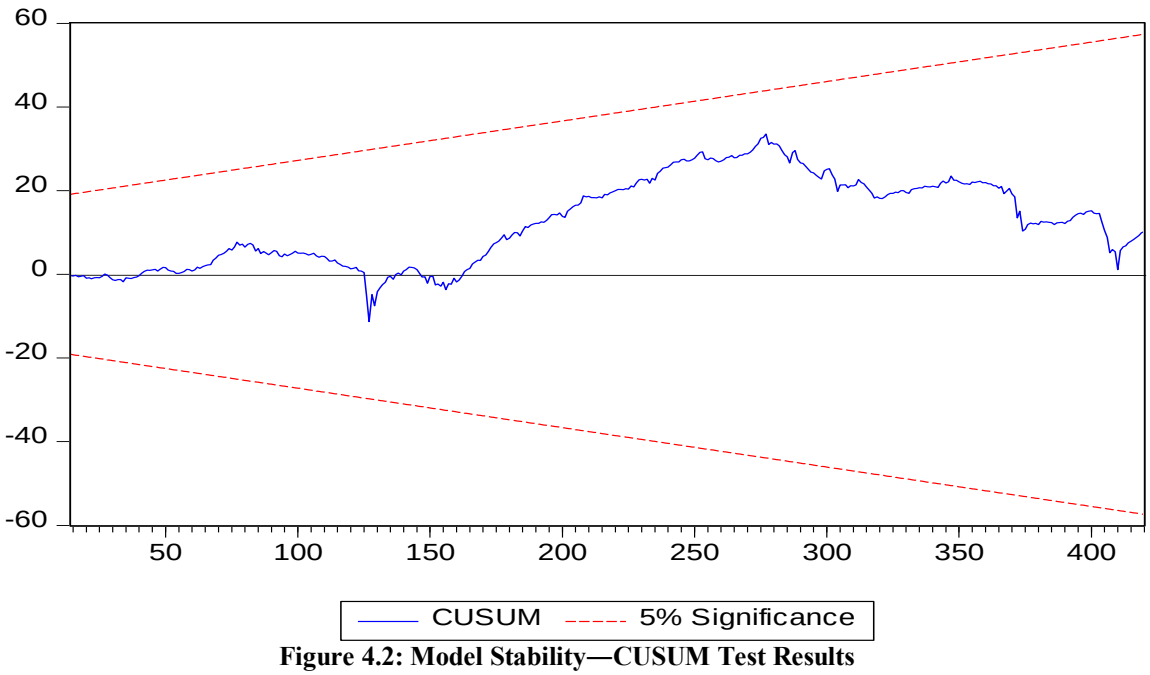


Figure 4.2: Model Stability—CUSUM Test Results

Source: Research Findings 2021

Figure 4.2 results showed that the cumulative sums of squares were generally within the CUSUM of 5 percent significance of the red dotted lines, which suggested that the

residual variances were not out-of-control, and thus the data was stable. That is, the CUSUM test did not indicate any evidence of data breakpoints or structural breaks that justified the absence of model misspecification. Based on the CUSUM results the study failed to reject the hypothesis of model stability, which implied that the data were all-stable and as such were suitable for successful inferential prediction.

4.6.3 Panel Data Stationarity and Cointegration Tests Results

The study used the panel-based unit root tests to explore the data stationarity and cointegration order 1(*d*) between interest diversification, non-interest diversification, technical efficiency, size and return on assets. The null hypothesis for Levin, Lin & Chu assumes a common unit root process for each variable, while ADF - Fisher Chi-square assume individual unit root process for the variables as shown in Table 4.5.

Table 4.5: Panel Unit Root Test Summary

Series: RoA, HHI_{II}, HHI_{NII}, TE and S
Sample: 2009 2018
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic lag length selection based on SIC: 0 to 1
Newey-West automatic bandwidth selection and Bartlett kernel

Variable	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root: Levin, Lin & Chu t*				
Return on Assets	-11.3049	0.0000	42	356
Interest Diversification (HHI_{II})	-13.3016	0.0000	42	359
Noninterest diversification (HHI_{NII})	-16.1475	0.0000	42	361
Technical Efficiency (TE)	-10.8525	0.0000	41	341
Size (S)	-14.3442	0.0000	42	361
Null: Unit root: ADF - Fisher Chi-square				
Return on Assets (ROA)	152.418	0.0000	42	356
Interest Diversification (HHI_{II})	175.517	0.0000	42	359
Noninterest diversification (HHI_{NII})	226.449	0.0000	42	361
Technical Efficiency (TE)	162.774	0.0000	41	341
Size (S)	154.016	0.0000	42	361

** Probabilities for Fisher tests computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Source: Research Findings 2021

Table 4.5 results indicated the absence of a unit root for all the variables. That is, both LLC and ADF—Fisher Chi-square were all statically significant ($p < .05$) at a 95 percent confidence level. Based on these results, the current study rejected the null hypothesis that the data contained unit root, and concluded that the data contained no unit roots (stationary) at the level. This implied that the panel data exhibited cointegration order 1(*0*) at level or the data co-integrated well, and as such, safe to adopt other panel data models that assume data stationarity.

4.6.4 Optimum Lag Length Selection Results

Different lags length could critically influence the substantive interpretation of the estimates, especially when the differences are large enough. The study assessed the appropriate optimal level that could generate the most efficient estimates as was indicated by the asterisk (*) in Table 4.6.

Table 4.6: VAR Lag Order Selection Criteria

Endogenous variables: Return on Assets (RoA)
Exogenous variables: C, HHI_{II}, HHI_{NII}, TE, S
Sample: 2009 2018

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-178.5187	NA	6.474733	4.705608	4.856680	4.766085
1	-157.9567	37.96060*	3.921391*	4.204019*	4.385304*	4.276591*
2	-157.7809	0.320046	4.005864	4.225152	4.441652	4.309819
3	-157.0880	1.243822	4.038491	4.233024	4.474738	4.329787
4	-157.0852	0.004913	4.144416	4.258594	4.530522	4.417452
5	-156.0999	1.717829	4.147538	4.258973	4.561115	4.379926
6	-155.9740	0.216424	4.243546	4.281384	4.613740	4.414432
7	-154.8249	1.944642	4.229764	4.277561	4.640131	4.422704
8	-153.7728	1.753468	4.226977	4.276225	4.669010	4.433464

** indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion Interest diversification (HHI_{II}), Non-interest diversification (HHI_{NII}), Size (S), Technical efficiency (TE), Return on assets (RoA).*

Source: Research Findings 2021

Table 4.6, shows FPE, AIC, SC and HQ results up to lag eight (8) that depicted that the optimal VAR lag order was appropriate for estimation at first lag (lag = 1) as indicated by (*). The criterion with the smallest value is preferred for model estimation to ensure

more degrees of freedom (Gujarati & Porter, 2009). Therefore, based on the AIC criterion which exhibited the smallest values (AIC = 4.204019*) the study estimated the models at optimal first lag (1) henceforth. This implied that AIC had the smallest estimates preferred relatively for the model's lags that minimize both the residual sum of squares and degrees of freedom of the data consistently.

4.7 Panel Data Diagnostic Tests Results

This study performed series of panel data diagnostic tests to evaluate the regression assumptions. These included Kolmogorov-Smirnov (K-S) and histograms for assessing normality, ANOVA for assessing linearity, Variance Inflator Factor (VIF) for assessing multicollinearity, Breusch-Godfrey Lagrange Multiplier (LM) for serial correlation, and Breusch-Pagan for heteroscedasticity.

4.7.1 Panel Normality Tests Results

This study used Kolmogorov-Smirnov (K-S) test and histogram to assess the data normality. The K-S results were as presented in Table 4.7.

Table 4.7: One-Sample Kolmogorov-Smirnov Test

		HHI_{II}	HHI_{NII}	TE	S	ROA
	N	420	420	420	420	420
Normal Parameters[a,b]	Mean	.3562	.6268	.6970	2.3788	2.0303
	Std. Deviation	.12387	.11858	.23037	3.1416	3.7605
Most Extreme Differences	Absolute	.057	.156	.094	.243	.159
	Positive	.038	.141	.094	.243	.093
	Negative	-.057	-.156	-.059	-.231	-.159
Kolmogorov-Smirnov Z		1.159	3.199	1.931	4.985	3.257
Asymp. Sig. (2-tailed)		.136	.000	.001	.000	.000

a. Test distribution is Normal. b. Calculated from data. Variables: Interest diversification (HHI_{II}), Non-interest diversification (HHI_{NII}), Size (S), Technical efficiency (TE), Return on assets (RoA).

Source: Research Findings 2021

Table 4.7 indicated that only interest diversification exhibited insignificant K-S tests results (HHI_{II} =1.16, p =.14), meaning that the data followed a normal distribution.

However, other variables were statistically significant ($p < .05$), meaning that the distribution deviated from a normal distribution. However, such a finding is relatively common for large samples and requires other normality assessment tests to make a valid normality verdict (Tabak et al., 2011). To validate the normality assumption, the study used normal histograms. Figure 4.3 shows the histogram for Return on Assets.

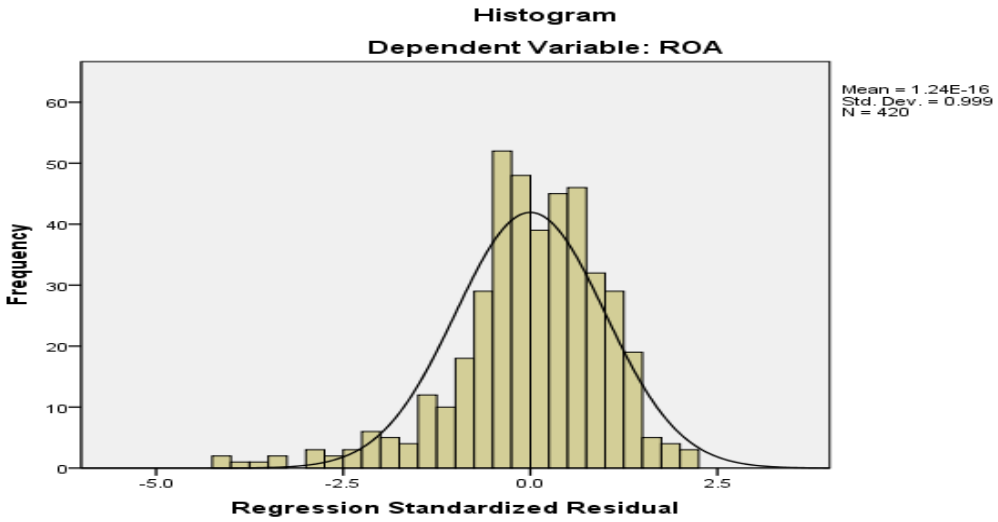


Figure 4.3: Histogram for Return on Assets

Figure 4.3 shows that the data for return on assets approximated the normal distribution with the peak clustered around zero, despite a few extreme spread to the negative side of the histogram. The symmetrical shape meant that the data met the normality assumption. Figure 4.4 shows the Histogram for Interest Diversification.

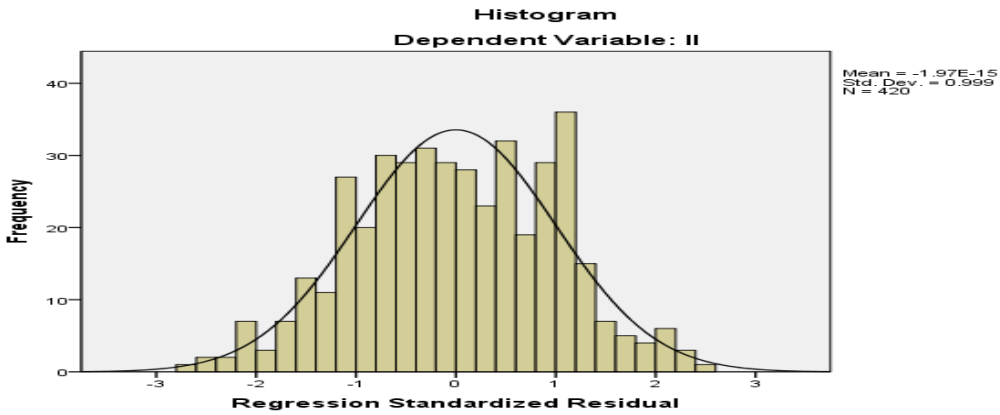


Figure 4.4: Histogram for Interest Diversification

Figure 4.4 reveals that interest diversification data approximated the symmetrical shape and the values clustered around zero, with a spread between positive and negative three. Figure 4.5 shows the histogram for non-interest diversification

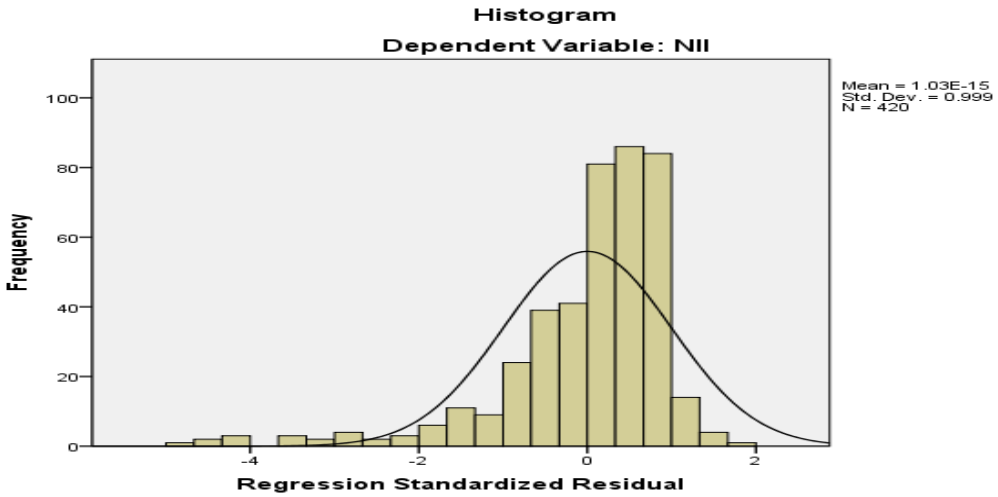


Figure 4.5: Histogram for non-interest diversification

Figure 4.5 reveals a symmetrical shape, meaning that non-interest diversification followed a normal distribution and negatively skewed. The figure revealed that most values clustered around zero, with mild outliers' up to negative four. Figure 4.6 shows the histogram for size.

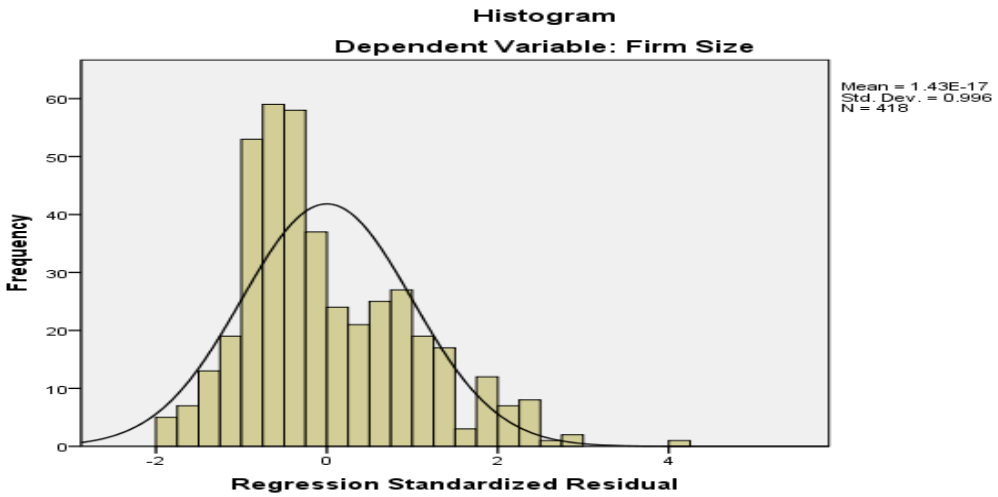


Figure 4.6: Histogram for Size

Figure 4.6 reveals that most of the values clustered around zero and that the histogram exhibited a symmetrical shape, meaning the size had few outliers and slightly skewed

towards the right. The data met the normality assumption. Figure 4.7 shows the histogram for technical Efficiency.

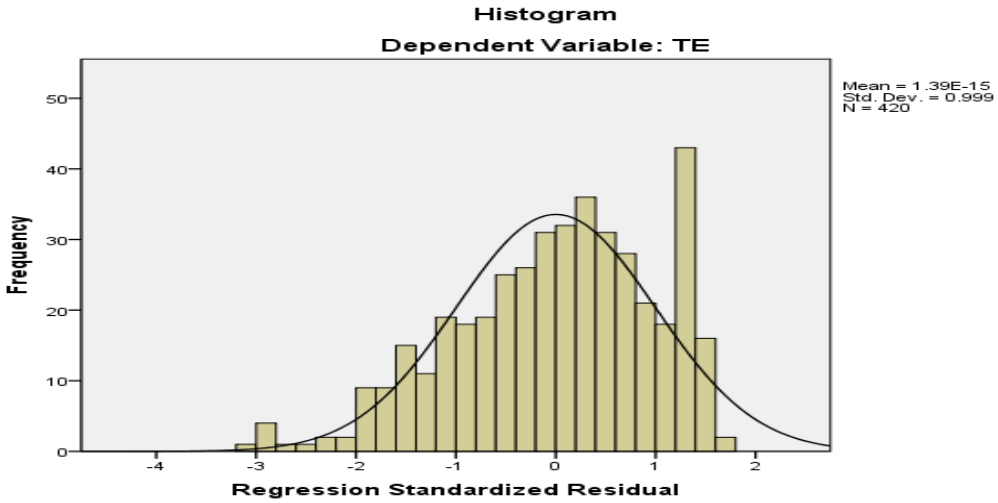


Figure 4.7: Histogram for Technical Efficiency

Figure 4.7 shows that the data for technical efficiency approximated normal distribution with the peak clustered around zero, and a few extreme spread to the negative side of the histogram. The figure shows a symmetrical shape, meaning the panel data met the normality assumption with certainty.

Despite the insignificance test results from the K-S test, the histogram normality test results for non-interest diversification, size, technical efficiency and return on assets showed symmetrical bell-shaped, and as such, the study failed to reject the normality distribution hypothesis. The overall verdict of the K-S and histograms, Durbin Watson, Kurtosis and Skewness test revealed that data did not deviate significantly from the normal distribution. The findings provided sufficient evidence that the data distribution was reasonably normal, and therefore, the study considered the panel data suitable for further analysis. This implied that the panel data was suitable and safe to use parametric statistical tests and other procedures that assume normality of data such as the Z-test statistic, t-test statistic, F-test statistic, Pearson's correlation statistics and panel least square regression analysis.

4.7.2 Linearity Tests Results

The study assessed for the paired interaction linearity using analysis of variance (ANOVA) with the measures of association, Eta-squared (η^2) for both linearity and deviation from linearity. The ANOVA for linearity and deviation from linearity test results for between groups and within groups were as presented in Table 4.8.

Table 4.8: Analysis of Variance

Variables			Sum of Squares	df	Mean Square	F-stat.	Sig.	Eta η^2
RoA and HHI_{II}	Between Groups	Combined	4.964	310	.016	1.191	.143	.772
		Linearity	.238	1	.238	17.737	.000	
		Deviation	4.726	309	.015	1.138	.217	
	Within Groups		1.465	109	.013			
	Total		6.429	419				
RoA and HHI_{NII}	Between Groups	Combined	4.551	310	.015	1.193	.141	.772
		Linearity	.200	1	.200	16.249	.000	
		Deviation	4.351	309	.014	1.144	.206	
	Within Groups		1.341	109	.012			
	Total		5.892	419				
RoA and TE	Between Groups	Combined	16.515	310	.053	1.015	.473	.743
		Linearity	.290	1	.290	5.530	.020	
		Deviation	16.225	309	.053	1.000	.509	
	Within Groups		5.721	109	.052			
	Total		22.236	419				
RoA and S	Between Groups	Combined	3532.003	310	11.394	2.106	.000	.857
		Linearity	1060.294	1	1060.294	195.98	.000	
		Deviation	2471.710	309	7.999	1.479	.009	
	Within Groups		589.691	109	5.410			
	Total		4121.695	419				

Source: Research Findings 2021

Table 4.8 shows that RoA and HHI_{II} ($F(1, 309) = 17.73$, $p = .00$, $\eta^2 = .77$), RoA and HHI_{NII} ($F(1, 309) = 16.249$, $p = .00$, $\eta^2 = .772$), RoA and TE ($F(1, 309) = 5.530$, $p = .020$, $\eta^2 = .743$) and RoA and S ($F(1, 309) = 195.987$, $p = .000$, $\eta^2 = .857$). These results indicated that all interactions were statistically significant with their corresponding Eta-squared ($\eta^{2)}$ values all greater than 5 percent ($\eta^2 > .05$). However, paired RoA and S

deviation from linearity was also significant, meaning that the interaction had a non-linear relationship in addition to the linear component

Table 4.8 results showed that the strengths of the combined interaction effects of the research variables were all strong. Thus, the study concluded that the relationships between groups or among the dependent and all independent variables were in a linear form. This implied that the influence of exogenous variables on the endogenous variables remained constant in the study's prediction model. In other words, the slope of the population regression function remained constant such that the effect of a unit changes in the independent variables, X_{it} (interest diversification, non-interest diversification, technical efficiency and size) on the dependent variable, Y_{it} (return on assets) did not depend on values of one or more exogenous variables.

4.7.3 Multicollinearity Test Results

The study used the Variance Inflation Factor (VIF) to assess for the presence or absence of multicollinearity between the independent variables. The rule of thumb is that if VIF equals a unit (VIF = 1), then the variables are not related to each other whereas a VIF between one to five ($1 \leq VIF \leq 5$) means a moderately correlated. VIF greater than five ($VIF \leq 5$) means highly correlated variables. Thus, with an increase in VIF, the lesser the reliability of regression results and a tolerance less than .2 or .1 (VIF more exceptional than 10) becomes problematic. Therefore, a VIF of a unit (1) upwards was desired, which informed on the variance percentage that inflated for each coefficient if there was no multicollinearity between variables. The collinearity diagnostics table has Eigenvalue, Conditional Index and Variance Proportions values were as shown in Table 4.9.

Table 4.9: Variance Inflation Factor Test Results

Coefficients[a]

Model	Unstandardized		Standardized	t	Sig.	Collinearity Statistics	
	B	Std. E	Beta			Tolerance	VIF
Constant	-2.778	1.022		-2.720	.007		
HHI_{II}	2.674	1.341	.088	1.995	.047	.978	1.023
HHI_{NII}	2.130	1.435	.067	1.485	.138	.931	1.074
TE	1.973	.723	.121	2.729	.007	.971	1.029
S	.481	.053	.402	9.072	.000	.973	1.027

Collinearity Diagnostics[a]

Model	Eigenvalue	Condition Index	Variance Proportions				
			Constant	HHI_{II}	HHI_{NII}	TE	S
1	4.265	1.000	.00	.01	.00	.00	.02
2	.562	2.755	.00	.01	.00	.01	.97
3	.104	6.396	.00	.56	.00	.41	.00
4	.052	9.048	.08	.40	.22	.55	.01
5	.016	16.095	.92	.04	.78	.03	.01

a. Dependent Variable: Return on Assets (RoA)

Source: Research Findings 2021

Table 4.9 coefficients model revealed that all the independent variables had tolerance less than one (<1) and VIF values greater but closer to a unit (1), a sense of orthogonal. That is, the variables HHI_{II} (β_1 = 2.674, VIF = 1.023), HHI_{NII} (β_2 = 2.130, VIF = 1.074), TE (β_3 = 1.973, VIF = 1.029) and S (β_4 = .481, VIF = 1.027) revealed that the variance coefficient could inflate by 2.3, 7.4, 2.9 and 2.7 percent respectively. The percentages show the possible coefficient inflation compared to when no multicollinearity with other predictors. These results implied that none of the study variables was redundant and was good for predictability. Further, the collinearity diagnostic results revealed that none of the Eigenvalues was close to zero, apart from dimension five (5) with Eigenvalues of .016 (or CI of 16.095). However, the corresponding values for dimension variable proportion values were all less than 0.9, meaning that there were no cases of multicollinearity problems in all the independent variables. Based on these results, the study found evidence or proof of the absence of multicollinearity and, which implied that the research model was orthogonal as such was good for further analysis.

4.7.4 Serial-Correlation Test Results

The study assessed the independence of the observations using the Breusch-Godfrey Serial Correlation (LM) Test. The test evaluated the presence of serial correlation with the null hypothesis of no serial correlation. The results were as presented in Table 4.10.

Table 4.10: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.453273	Prob. F(2, 406)		0.2350
Obs*R-squared	2.971183	Prob. Chi-Square(2)		0.2264
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Return on Assets RoA(-1)	-0.036063	0.180624	-0.199657	0.8418
Interest Diversification	-0.119217	0.964894	-0.123554	0.9017
Non-interest Diversification	0.013724	0.816591	0.016807	0.9866
Technical Efficiency	-0.042458	0.420704	-0.100922	0.9197
Size	0.006493	0.053945	0.120361	0.9043
Constant	-0.063277	0.649971	-0.097353	0.9225
R-squared	0.007108	Mean dependent var		-5.31E-18
Adjusted R-squared	-0.019793	S.D. dependent var		1.868335
S.E. of regression	1.886734	Akaike info criterion		4.135860
Sum squared resid	1445.265	Schwarz criterion		4.251711
Log likelihood	-852.3947	Hannan-Quinn criterion.		4.181658
F-statistic	0.264231	Durbin-Watson statistics		2.004173
Prob(F-statistic)	0.991641			

Test Equation: Dependent Variable: RESID, Method: autoregression distribution lag. Sample: 3 420, Included observations: 418, Pre-sample missing value lagged residuals set to zero.

Source: Research Finding 2021

Table 4.10 shows insignificant serial correlation LM test results for F-statistics, (F (2, 406) =1.453, p = .23) and observed R-squared Chi-squared (χ^2 (2) = 2.97, p = .23). The study failed to reject the hypothesis of no serial correlation, supported by the Durbin-Watson statistic (d = 2.00) of the model, which was within the two acceptable critical values range of 1.5 < d < 2.5. The estimation model revealed robustness since the error terms were uncorrelated with each other. Thus, implied that there was no first-order linear autocorrelation (serial correlation) in the data and as such, the study variables were independent of each other and as such safe to adopt other methods that assume no autocorrelation.

4.7.5 Heteroscedasticity Test Results

The variance of the linear regression model should be constant for the linear regression model to hold. A variable data is heteroscedastic if the error terms do not have a constant variation. The study used Breusch and Pagan (1979) test to test for the presence of heteroscedasticity, which in the regression model, the analysis assumes that the error terms are homogeneous. The hypothesis was that the error terms were homoscedastic against the alternative hypothesis that the error terms were heteroscedastic. It tests whether the variance of the errors from regression is dependent on the values of the independent variables, and the insignificant outcome desired. Breusch-Pagan-Godfrey was as shown in Table 4.11.

Table 4.11: Breusch-Pagan-Godfrey Test Results

F-statistic	3.723611		Prob. F(7,410)	0.54576
Obs*R-squared	245.98544		Prob. Chi-Square(7)	0.64416
Scaled explained SS	300.0196		Prob. Chi-Square(7)	0.0000
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
ROA(-1)	-0.253394	0.768805	-0.329595	0.7419
HHI	83.85401	26.42487	3.173298	0.0016
Technical Efficiency	-27.18792	11.96219	-2.272821	0.0236
Size	-2.531735	0.874278	-2.895801	0.0040
R-squared	0.59774	Mean dependent var		10.72846
Adjusted R-squared	0.43721	S.D. dependent var		53.66565
S.E. of regression	52.47938	Akaike info criterion		10.77767
Sum squared residual	1129175.	Schwarz criterion		10.85491
Log-likelihood	-2244.533	Hannan-Quinn criteria.		10.80820
F-statistic	3.723611	Durbin-Watson stat		2.025872
Prob (F-statistic)	0.64416			

Source: Research Findings 2021

Table 4.11 output revealed insignificant results F-statistics ($F(7, 410) = 3.72$, $p = .54$) and observed R-squared ($\chi^2(7) = 245.98$, $p = .64$). This implies that error terms were homogeneous and as such, there was no evidence of heteroscedasticity. Based on the insignificant ($p > .05$), the study failed to reject the hypothesis of heteroscedasticity and concluded that there was no evidence of heteroscedasticity, meaning that variance was homogeneous (homoscedasticity) and as such suitable for inferential prediction.

4.8 Correlation Analysis Results

The study employed correlation analysis to provide a clear understanding of the relationships between interest diversification (HHI_{II}), noninterest diversification (HHI_{NII}), technical efficiency (TE), size (S) and return on assets (RoA). The results guided on the strength of the linkages between two variables in a single value of Pearson product-moment coefficient (r), which ranges normally from a negative unit (-1) to a positive unit (1). A study uses correlation to assess whether a relationship between variables is either strong or weak and whether negative or positive. This study used a two-tailed test significance because there were no prior assumptions or expectations of either positive or negative correlations between any paired variables. The Pearson product-moment correlation analysis results were as presented in Table 4.12.

Table 4.12: Correlation[a] Analysis —Pearson Correlation

		ROA	HHI_{II}	HHI_{NII}	TE	S	HHI_{II}*S	HHI_{NII}*S
ROA	Pearson Corr.	1						
	Sig. (2-tailed)							
HHI_{II}	Pearson Corr.	.118*	1					
	Sig. (2-tailed)	.015						
HHI_{NII}	Pearson Corr.	.164**	.141**	1				
	Sig. (2-tailed)	.001	.004					
TE	Pearson Corr.	.148**	-.010	.165**	1			
	Sig. (2-tailed)	.002	.839	.001				
S	Pearson Corr.	.422**	.055	.159**	.041	1		
	Sig. (2-tailed)	.000	.265	.001	.397			
Interaction	Pearson Corr.	-.082	-.500**	-.183**	-.046	-.115*	1	
HHI_{II}*S	Sig. (2-tailed)	.093	.000	.000	.345	.018		
Interaction	Pearson Corr.	-.047	-.168**	-.601**	-.109*	.257**	.116*	1
HHI_{NII}*S	Sig. (2-tailed)	.332	.001	.000	.025	.000	.018	

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed). a. Listwise N=420

Source: Research Finding 2021

Table 4.12 revealed a varying degree of interrelationships among the four research variables. The results indicated that return on assets related positively with all the independent variable with significance (HHI_{II} (r = .118, p =.01), HHI_{NII}, (r = .164, p =.00), TE (r = .148), p = .00) and S (r = .422, p = .00)). These results meant that return on assets increases proportionately with an increase in interest and non-interest diversification, technical efficiency and size. Further, the table revealed an insignificant negative relationship between interest diversification and technical efficiency (r = -.01, p = .84) that meant that as the level of interest diversification increased, the technical efficiency reduced and vice versa. Similarly, there was an insignificant positive relation between size and interest diversification (r = .055, p = .265) and technical efficiency (r = .041, p =.39). The results meant that both technical efficiency and size moved in the same direction such that, as the size of a bank increases, the technical efficiency level increases as well. These findings were somewhat surprising because the expectation was that as bank size increases the technical efficiency level could decrease and vice-versa.

In summary, all the study variables exhibited weak interrelationships with each other that helped the study in separating the effect of the individual explanatory variable, in the regression model. The interpretation of the low but statistically significant correlation between the independent variables and the dependent variable meant that the variables interlinked each other without violation of the serial correlation and collinearity assumption. In a preview, the relationship between revenue diversification and financial performance was positive and significant statistically. Based on the Pearson correlation Cohen et al. (2003) guidelines criteria, the matrix indicated that the associations were moderate and as such, there were no autocorrelations and multicollinearity problems between any two variables and was safe to execute data analysis using panel data least square regression.

CHAPTER FIVE: HYPOTHESES TESTING AND DISCUSSIONS

5.1 Introduction

This chapter presents the inferential statistics tests results for the four null hypotheses along with the respective discussions, interpretations and findings. The main objective of this study was to assess the relationships between revenue diversification as the independent variable, technical efficiency as the mediating variable, size as moderating variable and financial performance as the dependent variable of commercial banks in Kenya. To achieve this main objective the study developed four specific objectives along with the respective testable null hypotheses. These hypotheses guided the assessment and facilitated the informed response to the main research question. The study subjected these propositions to empirical testing drawn from the descriptive and inferential statistical analysis. A study could infer the existence of a significant relationship only from a significant t-statistic. That is, the findings verdict were based the decision rule on the significance of the *t*-statistics as was represented by the *p*-values.

The first specific objective was to evaluate the direct effect of revenue diversification on financial performance. The study evaluated the objective through testing the first null hypothesis (H_1), which stated that revenue diversification does not significantly affect financial performance. The second specific objective was to assess the technical efficiency mediation effect on the relationship between revenue diversification and financial performance. The study assessed the objective through testing the second null hypothesis (H_2), which stated that technical efficiency does not mediate the relationship between revenue diversification and financial performance. The third specific objective was to evaluate the size moderation effect on the relationship between revenue diversification and financial performance. The study evaluated the objective through

testing the third null hypothesis (H_3), which stated that size does not moderate the relationship between revenue diversification and financial performance. Lastly, the fourth specific objective was to assess the joint effect of revenue diversification, technical efficiency and size on financial performance. The study assessed the objective through testing the fourth null hypothesis (H_4), which stated that revenue diversification, technical efficiency and size jointly do not significantly affect financial performance.

This study adopted panel least square fixed-effect to generate the inferential statistics. The procedure consisted of choosing the values of the unknown parameters that minimize the residual sum of squares as small as possible. The model was suitable because it has some attractive statistical properties of regression analysis including simplicity, intuitiveness and appealing than maximum likelihood. Given the normal distribution assumption, the panel least square estimators exhibit minimum-variance and consistent, unbiased and efficient estimators. That is, as the sample size increases indefinitely, the estimators converge to true population values.

The panel least squares regression model generated the goodness-of-fit coefficients estimators such as R-squared (R^2) coefficient, adjusted R-squared ($\bar{R}^2$) coefficient, F-statistics estimates, and the Durbin-Watson (d) among other inferential statistics for discussion and interpretation. These inferential statistics guided the study on the strength of the variables relatedness and the regression model fitness. The study reported the panel data outcomes and findings based on the adjusted R-squared ($\bar{R}^2$). Unlike R-squared (R^2), which increases irrespective of the predictive value of the additional predictor variable, adjusted R-squared ($\bar{R}^2$) adjusts accordingly for the number of predictors and standard error and as such increases only if the additional predictor improves the prediction model by more than expected by chance (Gujarati & Porter, 2009). In the same vein, adjusted

R-squared ($\bar{R}^2$) removes unnecessary variables, which does not add value to the predictive power of the panel regression model.

This study used F-statistic in the analysis to assess whether the overall linear regression models were of functional fitness to the research data. The F-statistic values indicated the significance level influence of the predictor variable(s) on the response variable. Further, the model generated standard error regression, sum squared residuals, log likelihood, the standard deviation dependent variance, mean dependent variance, information criteria and the Durbin-Watson (d) for discussion and interpretation. As a sum up, the regression models revealed the overall model fitness based on F-statistics guided by the probability of F-statistic values. These inferential statistics guided the study in the assessment of whether the regression model fitted well or the relationship between the variables occurred merely by chance or by model fitness. The interpretation of statistical values for each independent variable based on the statistical significance of the corresponding probability p-values.

In assessing the direction of the variables relationships, the study generated regression coefficients (β_0) for constant, the individual variable beta value (β_1) coefficient with the standard error (S.E) regression, t-statistics and p-values for discussion and interpretation. This study used the unstandardized beta (βs) coefficients because more than often, the constant (β_0) is included in the regression equation of the prediction model. The size of the slope (βs) coefficients measured the strengths of relationships between the independents, mediating, moderating and dependent variables. The study generated the results of the inferential statistics and presented them chronologically in the order of each objective/hypothesis in a single table. This consolidation of tables into a single table ensured clarity, ease of reference, and general convenience in readership.

5.2 Revenue Diversification and Financial Performance

The first objective of the study was to evaluate the direct effect of revenue diversification on financial performance of commercial banks in Kenya. A commercial bank's revenue streams consist of the interest income (II) and the non-interest income (NII) components. The interest income consists interest income from loans and advances, government securities, deposits and placements, and other interest income. Non-interest income consists of fees and commissions on loans and advances, other fees and commissions, foreign exchange trading, dividends incomes, and other non-interest incomes. The study used weighted composite diversification scores for the interest diversification index (HHI_{II}) and non-interest diversification index (HHI_{NII}). The two components constituted the independent variable, revenue diversification. The financial performance attributes comprised earnings before interest and tax over total assets. The resultant metric score was the return on assets (RoA) adopted as a proxy for financial performance.

The first null hypothesis (H_1) presented in chapter two stated as:

H_1: Revenue diversification does not significantly affect financial performance of commercial banks in Kenya.

To delineate the effect of each revenues stream on returns on assets, the study decomposed the first null hypothesis into the following two sub-null hypotheses:

H_{1I}**:** Interest diversification does not significantly affect returns on assets.

H_{12}: Non-interest diversification does not significantly affect returns on assets.

The study adopted the panel least square fixed-effect model stated and defined in chapter three equation 3.8_a and 3.8_b were as:

$$RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \varepsilon_{it}$$

$$RoA_{it} = \beta_0 + \beta_1(HHI_{NII})_{it} + \varepsilon_{it}$$

To realize the objective, the study conducted a panel least square regression of the return on assets (RoA) on both interest diversification (HHI_{II}) and noninterest diversification (HHI_{NII}) separately as shown in Tables 5.1 and 5.2, respectively.

5.2.1 Regression of Return on Assets on Interest Diversification

The study assessed the relationship between returns on assets and interest diversification level using a panel least squares fixed-effect regression model as presented in Table 5.1.

Table 5.1: Regression Results of Return on Assets on Interest Diversification

Dependent Variable: Return on Assets (RoA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.200924	0.571599	-0.351512	0.7254
Interest diversification (HHI_{II})	6.265513	1.552058	4.036908	0.0001
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.436991	Mean dependent var		2.03031
Adjusted R-squared	0.369249	S.D. dependent var		3.76056
S.E. of regression	2.986635	Akaike info criterion		5.12922
Sum squared resid	3336.076	Schwarz criterion		5.57172
Log likelihood	-1031.136	Hannan-Quinn criterion		5.30411
F-statistic	6.450828	Durbin-Watson statistic		1.44867
Prob(F-statistic)	0.000000			

Source: Research Finding 2021

Table 5.1 revealed a panel data sequential goodness-of-fit model with a statistical significant and positive linear relationship between return on assets and interest diversification ($\beta_1 = 6.27$, $p = .000$) with a statistical significant overall model ($\beta_1 = 6.27$, $p = .00$, $\bar{R}^2 = .37$, $F = 6.5$, $p = .00$, $d = 1.5$). The results provided enough evidence that the coefficient statistics were statistically significant and different from zero ($\beta \neq 0$, $P < .05$) and as such, the study strongly rejected the first sub null hypothesis (H_{11}).

These results suggested that interest diversification (HHI_{II}) accounted for 37 percent ($\bar{R}^2$ = .369) of the variations in return on assets with a good coefficient of determination of 44 percent (R^2 = .437), and the Durbin-Watson close to two ($d = 1.5 \approx 2$). In other words, the Durbin-Watson was within the accepted threshold ($1.5 \leq d \leq 2.5$), which implied the absence of the first-order autocorrelation, and as such, the assumption of the independent error terms was certainly met. The model results provided sufficient evidence that the relationships between variables were not by chance, but due to the regression model fitness ($\beta \neq 0$, $p < .05$). Further, the model showed that interest diversification was a good predictor variable for returns on assets as evidenced by F-statics results ($F(1, 419) = 6.45$, $p = .00$) and the R-squared (R^2) statistic lower than the *d* statistic ($R^2 = .43 < d = 1.45$), which justified the absence of spurious regression and therefore, the model was fit and reliable with good predictability.

Based on the regression test results, the study strongly rejected the first sub-null hypothesis (H_{11}), which stated that interest diversification does not significantly affect returns on assets. The rejection of the null hypothesis meant that the study concluded that interest diversification significantly affects financial performance. The resulted prediction linear regression equation stated in chapter three equation (3.8_a) to estimate the return on assets restated as in equation 5.1.

$$RoA_{it} = \beta_0 + \beta_1 (HHI_{II})_{it} + \varepsilon_{it}$$

$$RoA' = -0.201 + 6.266 (HHI_{II}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5.1)$$

Where: RoA´ is the predicted return on assets, representing financial performance,

: -.201 is the constant (β_0) or predicted value for RoA when HHI_{II} is zero,

: 6.266 is the estimated (β_1) change on RoA due to a unit change in HHI_{II},

: HHI_{II} is the interest diversification index.

Equation 5.1 implied that for every additional unit increase in interest diversification, return on assets increases by 6.3 units, ceteris paribus. Therefore, the study found that when the level of interest diversification increases, financial performance for commercial banks increases proportionately. Thus, the examination provided evidence that interest diversification significantly affects the financial performance of commercial banks in Kenya.

5.2.2 Regression of Returns on Assets on Non-interest Diversification

The study assessed the relationship between returns on assets and non-interest diversification using a panel least squares regression model as shown in Table 5.2.

Table 5.2: Regression Results of Return on assets on Non-Interest Diversification

Dependent Variable: Return on Assets (RoA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-1.205066	0.894039	-1.347890	0.1785
Non-interest diversification	5.161883	1.407176	3.668255	0.0003
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.432863	Mean dependent var		2.030310
Adjusted R-squared	0.364625	S.D. dependent var		3.760565
S.E. of regression	2.997563	Akaike info criterion		5.136525
Sum squared resid	3360.533	Schwarz criterion		5.579029
Log likelihood	-1032.670	Hannan-Quinn criterion		5.311423
F-statistic	6.343393	Durbin-Watson stat		1.475514
Prob(F-statistic)	0.000000			

Source: Research Findings 2021

Table 5.2 summary model results reported a positive and statistically significant relationship between return on assets and non-interest diversification with a significant overall model fitness ($\beta_1 = 5.16$, $p = .00$). $\bar{R}^2 = .36$, ($F(1, 419) = 6.34$, $p = .00$, $d = 1.5$).

The results demonstrated existence of a moderately weak relationship, suggesting that non-interest diversification explained 36 percent ($\bar{R}^2 = .36$) of the variations in return on assets. Consequently, the coefficient statistics were significantly different from zero ($\beta \neq 0$, $p < .05$); hence, the study strongly rejected the second sub null hypothesis (H_{12}).

That is, the study rejected the second sub-null hypothesis (H_{12}) which stated the non-interest diversification does not significantly affect returns on assets of commercial banks in Kenya. The rejection of the null hypothesis meant the study concluded that revenue diversification significantly affects financial performance of commercial banks in Kenya. The prediction linear regression equation defined and presented in chapter three equation (3.8_b) to estimate returns on assets was re-stated as in equation 5.2.

$$RoA_{it} = \beta_0 + \beta_1 (HHI_{NII})_{it} + \varepsilon_{it}$$

$$RoA' = -1.205 + 5.162 (HHI_{NII}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5.2)$$

Where: RoA is the predicted return on assets, representing financial performance),

: -1.205 the constant (β_0) or predicted value for RoA when the HHI_{NII} is zero

: 5.162 the estimated (β_1) change on RoA due to a unit change in HHI_{NII}

: HHI_{NII} is the non-interest diversification index (Predictor).

Equation 5.2 meant that for every additional unit increase in the non-interest diversification return on assets increases approximately by 5.162 units, ceteris paribus. Therefore, the study found that when the level of interest diversification increases, financial performance for commercial banks increases proportionately. Thus, the examination provided sufficient evidence that non-interest diversification significantly affects the financial performance of commercial banks in Kenya.

5.2.3 Summary of Hypothesis Test Results Relating to Objective One

In summary, the results from Tables 5.1 and Table 5.2, demonstrated that the panel least square fixed-effect regression model fitted the research data well. As such, the results provided sufficient evidence that return on assets had a positively and statistically significant relationship with both interest diversification ($\beta_1 = 6.27$, $p = .00$, $\bar{R}^2 = .37$, $F(1,419) = 6.5$, $p = .00$, $d = 1.5$) and non-interest diversification ($\beta_1 = 5.16$, $p = .00$, $\bar{R}^2 = .36$, $F(1, 419) = 6.34$, $p = .00$, $d = 1.5$). Further, the explanatory power of non-interest diversification ($\bar{R}^2 = .37$) was marginally lower than that of interest diversification ($\bar{R}^2 = .36$). This was a surprising finding since the study expected a wider margin because commercial banks generate interest income from the traditional banking activities, which is the main banking business and therefore, the reason for banks existence as opposed to non-interest income. Commercial banks generate non-interest income from non-core banking activities, and as a result of banking activities diversification through strategic products and services. Thus, in the context of banking, perhaps banks seem to use the non-interest stream to smoothen the profitability curve.

Therefore, the summary results from Table 5.1 and Table 5.2 meant that the contribution of non-interest diversification was that of complementary rather than substitution in the banking quest to enhancing financial performance. Based on the results of the first sub null hypothesis (H_{11}) and the second sub null hypothesis (H_{I2}), this study rejected the first null hypothesis (H_1), which stated that revenue diversification does not significantly affect the financial performance of commercial banks in Kenya and concluded that revenue diversification significantly affects financial performance of commercial banks in Kenya.

5.3 Revenue Diversification, Technical Efficiency and Financial Performance

The second objective of this study was to assess the technical efficiency mediation effect on the relationship between revenue diversification and financial performance of commercial banks in Kenya. The study used the Baron and Kenny (1986) model and according to the model, the four fundamental criteria for establishing an intervening effect must be satisfied. That is, the method provides the necessary and sufficient cardinal rule of thumb that must be satisfied for a study to conclude that the mediation effect existed. In other words, the investigation must fulfil the first three necessary conditions —step 1-3 and the fourth final and sufficient condition —step 4 for the intervention assessment (Mackinnon et al., 2002).

First, the independent variable must relate directly to the dependent variable in step one. That is, a statistically significant relationship between the independent and the dependent variables must exist, in the absence of the mediating (third) variable. In the context of the current study, the independent variable revenue diversification had two attributes; interest diversification and non-interest diversification, which both must have a significant direct (primary) relationship with financial performance, attribute; return on assets (dependent variable) of banks. A study could continue to the second intervention assessment condition only if the first condition has been satisfied.

Secondly, the independent variable must relate directly to the mediating variable in step two. That is, there must be a statistically significant relationship between the independent variable and the intervening variable in the absence of the dependent variable. In the current study's context, the independent attributes interest diversification and non-

interest diversification separately must have a statistically significant direct relationship with technical efficiency (mediator) in absence of return on assets (dependent).

Thirdly, the mediating variable must have a direct relationship with the dependent variable in step three. That is, there must be a statistically significant relationship between the intervening variable and the dependent variable, in the absence of the independent variable. In the context of the current study, technical efficiency (mediating variable) must have a statistically significant direct relationship with financial performance (dependent variable), in absence of revenue diversification (independent variable) effect in the model.

Fourthly, the direct relationship between the independent variable and the dependent variable must not hold in step four. That is, when the study controls for the mediation effect in the model, the independent variable effect on the dependent variable becomes statistically insignificant for a full mediation to have occurred. Alternatively, the effect reduces materially for a partial intervention to have occurred. In the context of this study, controlling for the intervening effect of technical efficiency from the model, interest diversification and non-interest diversification effect on returns on assets must reduce materially for a partial mediation or no longer holds for a full intervention.

The second null hypothesis (H_2) as stated in chapter three restated as:

H_2: Technical efficiency does not mediate the relationship between revenue diversification and financial performance of commercial banks in Kenya.

In order to enhance the assessment clarity, the study decomposed the second null hypothesis into the following two sub null hypotheses:

H_{21}: Technical efficiency does not mediate the relationship between interest diversification and returns on assets of commercial banks in Kenya.

H_{22}: Technical efficiency does not mediate the relationship between non-interest diversification and returns on assets of commercial banks in Kenya.

The prediction analytical model used to assess the mediation effect followed Baron and Kenny (1986) s' four-step regression model. The models' steps defined and presented in chapter three equations $3.9_{a,b}$, $3.10_{a,b}$, 3.11 and $3.12_{a,b}$ respectively were restated as:

Step 1: $RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \varepsilon_{it}$

$RoA_{it} = \beta_0 + \beta_1(HHI_{NII})_{it} + \varepsilon_{it}$

Step 2: $TE_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \varepsilon_{it}$

$TE_{it} = \beta_0 + \beta_1(HHI_{NII})_{it} + \varepsilon_{it}$

Step 3: $RoA_{it} = \beta_0 + \beta_1(TE)_{it} + \varepsilon_{it}$

Step 4: $RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \beta_2 (TE)_{it} + \varepsilon_{it}$

$RoA_{it} = \beta_0 + \beta_1(HHI_{NII})_{it} + \beta_2 (TE)_{it} + \varepsilon_{it}$

Where : RoA_{it} is the predicted returns on assets (dependent) for bank *i* at time *t*

: TE_{it} is technical efficiency (Mediator) for bank *i* at time *t*

: β_0 is the constant

: β_1 and β_1 are the regression coefficients

: HHI_{II} is the interest diversification (independent) for bank *i* at time *t*

: HHI_{NII} is the non-interest diversification (independent) for bank *i* at time *t*

: ε_{it} is the error term for bank *i* at time *t*

Baron and Kenny (1986) s' model four fundamental criteria for establishing the intervening effect must be satisfied. That is, the method provides the necessary and sufficient cardinal rule of thumb that must be satisfied for a study to conclude that the mediation effect exists. In other words, the investigation must fulfil the first three necessary conditions —step 1-3 and the fourth final and sufficient condition —step 4 for the intervention assessment (Mackinnon et al., 2002).

5.3.1 Regression of Returns on Assets on Interest Diversification

The first step stated that the independent variable must significantly relate directly to the dependent variable. The study assessed the direct relationship between interest diversification and return on assets, and the results were as presented in Table 5.3.

Table 5.3: Regression Results of Returns on Assets on Interest Diversification

Dependent Variable: Return on Assets (RoA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.200924	0.571599	-0.351512	0.7254
Interest diversification (HHI_{II})	6.265513	1.552058	4.036908	0.0001
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.436991	Mean dependent var		2.030310
Adjusted R-squared	0.369249	S.D. dependent var		3.760565
S.E. of regression	2.986635	Akaike info criterion		5.129220
Sum squared resid	3336.076	Schwarz criterion		5.571725
Log likelihood	-1031.136	Hannan-Quinn criterion		5.304118
F-statistic	6.450828	Durbin-Watson statistic		1.448675
Prob(F-statistic)	0.000000			

Source: Research Finding 2021

Table 5.3 revealed a statistically significant and positive linear relationship between return on assets and interest diversification ($\beta_1 = 6.3$, $p = .00$). The resultant prediction equation to estimate RoA restated as in equation 5.3.

$$RoA_{it} = \beta_0 + \beta_1 (HHI_{II})_{it} + \varepsilon_{it}$$

$$RoA' = -0.201 + 6.266 (HHI_{II}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5.3)$$

Where: RoA´ is the predicted return on assets, representing financial performance, -.201 is the constant (β_0), 6.266 is the expected estimate (β_1) change on RoA. Equation 5.3 showed a significant relationship between returns on assets and interest diversification which demonstrated that the first condition was to the satisfaction of the study and thus, the study retained the variable to evaluate the second mediation assessment.

5.3.2 Regression of Return on Assets on Non-Interest Diversification

The first step assessed the relationship between non-interest diversification and return on assets. The regression results were as shown in Table 5.4.

Table 5.4: Regression Results of Return on Assets on Non-Interest Diversification

Dependent Variable: Return on Assets (RoA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-1.205066	0.894039	-1.347890	0.178
Non-interest diversification	5.161883	1.407176	3.668255	0.000
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.432863	Mean dependent var		2.03031
Adjusted R-squared	0.364625	S.D. dependent var		3.76056
S.E. of regression	2.997563	Akaike info criterion		5.13652
Sum squared resid	3360.533	Schwarz criterion		5.57902
Log likelihood	-1032.670	Hannan-Quinn criterion		5.31142
F-statistic	6.343393	Durbin-Watson statistic		1.47551
Prob(F-statistic)	0.000000			

Source: Research Finding 2021

Table 5.4 revealed a statistical significant relationship between non-interest diversification and return on assets ($\beta_1 = 5.16$, $p = .00$). The resultant prediction linear regression equation defined in chapter three equation (3.9_b) as restated in equation 5.4.

$$RoA_{it} = \beta_0 + \beta_1(HHI_{NII})_{it} + \varepsilon_{it}$$

$$RoA' = -1.21 + 5.16\ (HHI_{NII}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5.4)$$

Where: RoA´ is the predicted return on assets, representing financial performance, -1.2 is the constant (β_0), 5.16 is the change on RoA due to a unit change in HHI_{NII}. Equation 5.4 showed a positive direct relationship between non-interest diversification and return on assets. These results suggested that the assessment met the first condition. Therefore, based on these outputs the study retained the variable for the second step evaluation.

5.3.3 Regression of Technical Efficiency on Interest Diversification

In the second step, the study assessed the direct relationship between interest diversification and technical efficiency. The results were as presented in Table 5.5.

Table 5.5: Regression Results of Technical Efficiency on Interest Diversification

Dependent Variable: Technical Efficiency (TE)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.725923	0.041281	17.58502	0.000
Interest diversification	-0.081351	0.112089	-0.725771	0.468
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.218018	Mean dependent var		0.69695
Adjusted R-squared	0.123929	S.D. dependent var		0.23044
S.E. of regression	0.215694	Akaike info criterion		-0.12686
Sum squared resid	17.40000	Schwarz criterion		0.31564
Log likelihood	72.64062	Hannan-Quinn criterion		0.04803
F-statistic	2.317155	Durbin-Watson stat		1.64599
Prob(F-statistic)	0.000011			

Source: Research Finding 2021

Table 5.5 revealed that the regression coefficient for interest diversification was negative and insignificant (β_1 = -.08, p = .47). The prediction model presented and defined in chapter three equation 3.10_a was as stated in equation 5.5.

Step 2: $TE_{it} = \beta_0 + \beta_1 (HHI_{II})_{it} + \varepsilon_{it}$

: $TE = .73 + -.08(HHI_{II})$ …….……. (5.5)

Where: TE is the technical efficiency, .73 is the constant, -.08 is the regression coefficient for interest diversification. However, the insignificance of the statistics implied that interest diversification had no significant relationship with technical efficiency. This finding violated the second condition, which stated that the dependent variable must relate significantly to the mediator. Thus, the study terminated the variable from the third step and further, dropped it from the mediation assessment.

5.3.4 Regression of Technical Efficiency on Non-Interest Diversification

Further, in the second step, the study assessed the direct relationship between non-interest diversification and technical efficiency. The results were as presented in Table 5.6

Table 5.6: Regression Results of Technical Efficiency on Non-Interest Diversification

Dependent Variable: Technical Efficiency (TE)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.535678	0.063820	8.393599	0.0000
Non-interest diversification	0.257305	0.100450	2.561539	0.0108
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.230418	Mean dependent var		0.696953
Adjusted R-squared	0.137822	S.D. dependent var		0.230446
S.E. of regression	0.213977	Akaike info criterion		-0.142845
Sum squared resid	17.12408	Schwarz criterion		0.299659
Log likelihood	75.99737	Hannan-Quinn criterion		0.032053
F-statistic	2.488408	Durbin-Watson statistics		1.703339
Prob(F-statistic)	0.000002			

Source: Research Finding 2021

Table 5.6 revealed that the relationship between technical efficiency and non-interest diversification was statistically significant (β_1 = .257, p = .01). The prediction model presented and defined in chapter three equation 3.10_b as restated in equation 5.6.

Step 2: $TE_{it} = \beta_0 + \beta_1(HHI_{NII})_{it} + \varepsilon_{it}$

: $TE = .53 + .257(HHI_{NII})$ ……..……. (5.6)

Where: TE is the technical efficiency, .53 is the constant, -.257 is the coefficient for non-interest diversification. Therefore, the interpretation of this is that for every unit increase in non-interest diversification, technical efficiency increases by .257 units. The significance of the statistic implied that non-interest diversification related significantly to technical efficiency and as such, the second condition was satisfactory and the study retained the variable for assessment in the third step.

5.3.5 Regression of Returns on Assets on Technical Efficiency

The third step assessed the direct relationship between returns on assets and technical efficiency. The regression results were as presented in Table 5.7.

Table 5.7: Regression Results for Return on Assets on Technical Efficiency

Dependent Variable: Return on Assets (RoA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	1.082554	0.528256	2.049297	0.041
Technical efficiency	1.359857	0.727519	1.869170	0.062
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.417896	Mean dependent var		2.03031
Adjusted R-squared	0.347857	S.D. dependent var		3.76056
S.E. of regression	3.036859	Akaike info criterion		5.16257
Sum squared resid	3449.220	Schwarz criterion		5.60507
Log likelihood	-1038.140	Hannan-Quinn criterion		5.33747
F-statistic	5.966595	Durbin-Watson stat		1.41077
Prob(F-statistic)	0.000000			

Source: Research Finding 2021

Table 5.7 showed a positive and insignificant relationship between return on assets and technical efficiency (β_1 = 1.35, p = .06). This provided evidence of an insignificant positive relationship between return on assets and technical efficiency that meant that the third condition was not to the satisfaction of the study. The resulting regression equation reported in chapter three equation (3.13) restated as in equation (5.7).

$$RoA_{it} = \beta_0 + \beta_1 (TE)_{it} + \varepsilon_{it}$$

$$RoA = 1.08 + 1.36 (TE) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5.7)$$

Where: RoA is the return on assets, TE is the technical efficiency, 1.08 is the constant, 1.36 is the estimated change on RoA due to a unit change in TE. Since the results revealed violation of the third assessment condition, the study terminated the mediation assessment henceforth since mediation was unviable.

5.3.6 Summary of the Hypothesis Test Results Relating to Objective Two

The second objective of the study assessed the mediation effect of technical efficiency on the relationship between revenue diversification and financial performance. The second null hypothesis (H_2) stated that technical efficiency does not mediate the relationship between revenue diversification and financial performance. The mediation assessment results revealed that both interest and non-interest diversification had a significant effect on return on assets in step one. This implied that the first condition was to the satisfaction of the study and as such, the study retained the variables and progressed the assessment to the second step (see table 5. 3 & 5.4).

The second step revealed that technical efficiency related insignificantly with interest diversification, but significantly with non-interest diversification. This implied that interest diversification did not satisfy the second condition (dropped) while the non-interest diversification relation satisfied the second condition and the study retained the variable for the fourth assessment subject to the third step verdict. The third step results showed that the relationship between technical efficiency and return on assets was statistically insignificant. This implied that the third intervention assessment was not satisfactory. Since the first three steps (1-3) were necessary conditions to perform the fourth step, the study terminated the fourth mediation assessment since it was unviable.

Based on Baron and Kenny's mediation assessment steps and the verdict thereof, the study failed to reject the second null hypothesis (H_2) that stated technical efficiency does not mediate the relationship between revenue diversification and financial performance of commercial banks in Kenya. Thus, the study concluded that technical efficiency does not mediate the relationship between revenue diversification and financial performance of commercial banks in Kenya.

5.4 Revenue Diversification, Size and Financial Performance

The third objective of this study was to assess the moderation effect of size on the relationship between revenue diversification and financial performance. The third null hypothesis (H_3) presented in chapter two stated as:

H_3: Size does not moderate the relationship between revenue diversification and financial performance of commercial banks in Kenya.

In order to approve or disapprove of the above hypothesis, the study decomposed the hypothesis into the following two sub-null hypotheses:

H_{31}: Size does not moderate the relationship between interest diversification and returns on assets.

H_{32}: Size does not moderate the relationship between non-interest diversification and returns on assets.

This study evaluated the moderation effect of size using the steps proposed by Baron and Kenny in 1986. According to the authors, a moderator exists only if the third variable influences or varies the relationship between the predictors and the predicted outcome under a set of specified conditions. In other words, a moderator is a third variable, which explains how the dependent variable and independent variables associate with each other. The model entailed assessing the influence of size interaction on the relationship between revenue diversification and financial performance in two phases: First, the interactions effect of size and interest diversification on returns on assets, and secondly the interaction effect of size and non-interest diversification on returns on assets. The approach was important in delineating the moderation effect of each revenue diversification level on financial performance. This decomposition provided clarity on the influence of size on the relationship between revenue diversification and financial performance.

5.4.1 Regression of Returns on Assets on Size and Interest Diversification

The study assessed the interaction effect of size and interest diversification on returns on assets. The regression results were as presented in Table 5.8.

Table 5.8: Regression Results of Return on Assets on Size Interaction

Dependent Variable: Return on Assets (RoA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.596305	0.642686	-0.927833	0.3541
Interest diversification (HHI_{II})	3.629641	1.717416	2.113431	0.0352
Size (S)	0.559685	0.074284	7.534365	0.0000
Interaction (HHI_{II}*S)	0.049076	0.237096	0.206990	0.8361
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.514413	Mean dependent var		2.030310
Adjusted R-squared	0.453062	S.D. dependent var		3.760565
S.E. of regression	2.781136	Akaike info criterion		4.990807
Sum squared resid	2877.316	Schwarz criterion		5.452550
Log likelihood	-1000.069	Hannan-Quinn criterion		5.173309
F-statistic	8.384737	Durbin-Watson statistics		1.449810
Prob(F-statistic)	0.000000			

Source: Research Finding 2021

Table 5.8 revealed that the size interaction effect of interest diversification ($\beta_1 = 3.63$, $p = .035$) and size ($\beta_2 = .56$, $p = .00$) were significant, while the interaction (HHI_{II}*S) effect was positive, but insignificant ($\beta_3 = .049$, $p = .84$). Further, the overall model was significant ($\bar{R}^2 = 0.45$, $F = 8.38$, $p = .00$, $d = 1.5$), indicating the model explained about 45 percent of the variation in return on assets. The insignificance of the interaction terms effects meant that the moderation effect did not occur without any material change effect observed in the relationship. Based on these results, the study failed to reject the first sub-null hypothesis (H_{31}) and concluded that size does not significantly affect the relationship between interest diversification and return on assets in Kenya.

5.4.2 Regression of Return on Assets on Size and Non-Interest Diversification

The study assessed the interaction effect of size and non-interest diversification on returns on assets. The regression results were as presented in Table 5.9.

Table 5.9: Regression of Return on Assets on Size Interaction

Dependent Variable: Return on Assets (RoA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.934029	1.269015	0.736027	0.4622
Non-interest diversification (HHI_{NII})	-0.486897	2.059459	-0.236420	0.8132
Size (S)	0.635211	0.077139	8.234627	0.0000
Interaction (HHI_{NII}*S)	-0.682669	0.296556	-2.301989	0.0219
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.521498	Mean dependent var		2.030310
Adjusted R-squared	0.461042	S.D. dependent var		3.760565
S.E. of regression	2.760772	Akaike info criterion		4.976109
Sum squared resid	2835.333	Schwarz criterion		5.437852
Log likelihood	-996.9828	Hannan-Quinn criter.		5.158611
F-statistic	8.626084	Durbin-Watson stat		1.506685
Prob(F-statistic)	0.000000			

Source: Research Finding 2021

Table 5.9 revealed that in the presence of interaction terms the effect of non-interest diversification statistics became negative and statistically insignificant (β_1 = -.49, p = .81) while size (β_2 = .63, p = .00) and the interaction effect were statistically significant (β_3 = -.68, p = .02). Further, the effects specification for cross-section fixed statistics revealed a statistically significant F-statistics ($\bar{R}^2$ = .46, F = 8.6, p = .00, *d* = 1.5).

The insignificance of non-interest diversification and the significance of the interaction terms effects meant that the moderation effect occurred. That is, there was a significant effect observed on the relationship between the non-interest diversification and return on assets in the presence of the interaction term. Based on these results, the study rejected

the second sub-null hypothesis (H_{32}) and concluded that bank size moderates the relationship between non-interest diversification and return on assets in Kenya. The prediction model equation was as presented in equation 5.8.

$$RoA_{it} = \beta_0 + \beta_1 (HHI_{NII})_{it} + \beta_2 (S)_{it} \ \beta_3 (HHI_{NII}*S) + \varepsilon_{it}$$

$$RoA = .93 + -.49 (HHI_{NII}) + .63(S) + -.68(HHI_{NII}*S) \ldots\ldots\ldots\ldots\ldots\ldots \quad (5.8)$$

Where: RoA is the predicted return on assets, .93 is the RoA value when HHI_{NII}, S and interactions are zero, -.49 is the effect of HHI_{NII} on RoA when S and interaction values are zero, .63 is the effect of S on RoA when HHI_{NII} and interaction value is zero, and -.68 is the effect of interaction when HHI_{NII} and S values are zero. Equation 5.8 means that for every .63 units increase size return on assets decreases by .49 HHI_{NII} units, else held constant.

5.4.3 Summary of the Hypothesis Test Results Relating to Objective Three

In summary, the third hypothesis assessed the size moderation effect on the relationship between revenue diversification and financial performance. The significance of interest diversification and insignificance of interaction effect implied the absence of moderation effect. Thus, size does not moderate the relationship between interest diversification and financial performance. The insignificance of non-interest diversification and the significance of the interaction terms meant that the moderation effect occurred. Thus, the size moderated the relationship between non-interest diversification and returns on assets. Based on these results, the study failed to reject the first sub-null hypothesis (H_{31}), which implied that size does not moderate the relationship between interest diversification and return on assets. Secondly, the study rejected the second sub-null hypothesis (H_{32}), which implied that size significantly affects the relationship between non-interest diversification and return on assets.

5.5 Revenue Diversification, Technical Efficiency, Size and Financial Performance

The fourth specific objective was to evaluate the joint effect of revenue diversification, technical efficiency and size on financial performance of commercial banks in Kenya. The fourth specific null hypothesis (H_4) as stated in chapter two was:

H_4: Revenue diversification, technical efficiency and size jointly do not significantly affect financial performance of commercial banks in Kenya.

The regression prediction model presented in chapter three equation (3.14) stated as:

$$RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \beta_2(HHI_{NII})_{it} + \beta_3(TE)_{it} + \beta_4(S)_{it} + \varepsilon_{it}$$

Where : RoA is the predicted return on assets, representing the dependent variable financial performance, β_0 is the unconditional constant for RoA when all variables are zero, β_1, β_2, β_3 and β_4 are the unconditional regression coefficients, HHI_{II} is interest diversification, HHI_{NII} is non-interest diversification, TE is the technical efficiency, S is the size, and ε is the error term.

5.5.1 Regression of Returns on Assets, Revenue Diversification, Technical Efficiency and Size

A panel least squares regression analysis was used to assess the joint effect of revenue diversification (independent), technical efficiency (mediator) and size (moderator) on return on assets (dependent). The study decomposed revenue diversification into interest diversification and non-interest diversification, while return on assets represented financial performance. The study conceptualized technical efficiency as a mediator and size as a moderator. The regression results were as presented in Table 5.10.

Table 5.10: Regression of Return on Assets on Revenue Diversification, Technical Efficiency and Size

Dependent Variable: Return on Assets (RoA)
Method: Panel Least Squares
Sample: 2009 2018
Periods included: 10
Cross-sections included: 42
Total panel (unbalanced) observations: 420

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-2.795543	0.990683	-2.821834	0.005
Interest diversification	3.256958	1.488739	2.187729	0.029
Non-interest diversification	2.529797	1.338611	1.889866	0.059
Technical efficiency	1.173470	0.667268	1.758619	0.079
Size	0.530732	0.072539	7.316539	0.000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.524250	Mean dependent var	2.03031
Adjusted R-squared	0.462698	S.D. dependent var	3.76056
S.E. of regression	2.756528	Akaike info criterion	4.97510
Sum squared resid	2819.023	Schwarz criterion	5.44646
Log likelihood	-995.7713	Hannan-Quinn criterion	5.16140
F-statistic	8.517124	Durbin-Watson statistics	1.46910
Prob(F-statistic)	0.000000		

Source: Research Finding 2021

Table 5.10 coefficients model revealed that return on assets related positively with all the array of the independent variables. These results implied that the level of return on assets increases with an increase in interest diversification, non-interest diversification, technical efficiency, and bank size. In other words, return on assets exhibited a statistically significant relationship with both interest diversification ($\beta_1 = 3.26$, $p = .029$) and size ($\beta_4 = .53$, $p = .00$). However, return on assets exhibited insignificant relationships with both non-interest diversification ($\beta_2 = 2.53$, $p = .059$) and technical efficiency ($\beta_3 = 1.17$, $p = .079$). Further, the F-statistic tests for the joint null hypothesis (H_4) overall model fitness showed a statistical significant prediction model ($R^2 = .52$, $\bar{R}^2 = .46$, $F = 8.51$, $p = .00$, $d = 1.5$). Precisely, these results showed that interest diversification, non-interest diversification, technical efficiency and size jointly

explained about 46 percent ($\bar{R}^2$ = .46) of the variation in return on assets. Hence, the study strongly rejected the fourth null hypothesis (H_4) and concluded that the model as a whole was highly significant.

Based on these results the study rejected the fourth null hypothesis (H_4) which stated that jointly revenue diversification, technical efficiency and size do not significantly affect financial performance of commercial banks in Kenya. The study, therefore, concluded that jointly revenue diversification, technical efficiency and size significantly affect financial performance of commercial banks in Kenya. Therefore, the resultant panel least square regression equation to estimate RoA was as shown in equation 5.9

$$RoA_{it} = \beta_0 + \beta_1(HHI_{II})_{it} + \beta_2(HHI_{NII})_{it} + \beta_3(TE)_{it} + \beta_4(S)_{it} + \varepsilon_{it}$$

$$RoA = -2.8 + 3.26(HHI_{II}) + 2.53(HHI_{NII}) + 1.17(TE) + .53(S) \ldots\ldots \quad 5.9$$

Where: RoA_{it}: is the return on assets representing financial performance for bank *i* at time *t*, -2.8 is the regression constant, a value of ROA when all variables values are zero, 3.26, 2.53, 1.17 and .53 are the regression coefficients for interest diversification (HHI_{II}), non-interest diversification (HHI_{NII}), technical efficiency (TE) and size (S) on return on assets (RoA). These results meant that for every unit increase in interest diversification, non-interest diversification, technical efficiency and size, the predicted return on assets increases proportionately by 3.26, 2.53, 1.17 and .53 respectively. The findings are in tandem with the study's initial anticipation of a positive linear relationship between revenue diversification, technical efficiency size and financial performance. These findings showed that the relationship between the variables did not occur by chance but due to the model fitness of the research data. This finding of jointly positive relationship affirmed the perceived remarkably relatedness of the four conceptualized variables.

5.6 Discussions of the Null Hypotheses Tests Results

The preliminary section of this chapter presented the inferential test results for the four null hypotheses for discussion and interpretation. This study based the findings on the statistics results from the descriptive statistics, correlations and panel least square regression analysis. Descriptive statistics provided the prologue of the study, while the correlation and panel regression analysis provided the magnitude and direction of the variables relationships respectively. The main objective of the study was to assess the relationship between revenue diversification, technical efficiency, size and financial performance of commercial banks in Kenya. The study decomposed the main objective into four specific objectives, each assessed through a specific null hypothesis. This section presents discussions of the hypotheses test results in chronological order of the first through the fourth specific objectives. At the end of each discussion, the study provides a table summarizing each objective, hypothesis, results and findings.

5.6.1 Revenue Diversification and Financial Performance.

The first specific objective was to evaluate the direct effect of revenue diversification on financial performance of commercial banks in Kenya. This study evaluated the objective through testing the first null hypothesis (H_1) that stated that revenue diversification does not significantly affect financial performance of commercial banks in Kenya. The panel regression analysis revealed a positive significant relationship between returns on assets and both interest ($\beta_1 = 6.27$, $p = .00$) and non-interest ($\beta_1 = 5.16$, $p = .00$) diversification, and separately, each explained 37 percent of the variations in return on assets. Since the statistical values were all significantly different from zero ($\beta \neq 0$, $p < .05$), the study rejected the first null hypothesis (H_1) and concluded that revenue diversification significantly affects financial performance of commercial banks in Kenya. Thus, this

study revealed that revenue diversification level positively linked with bank profitability, suggesting that more diversified banks tend to have higher returns on assets. Perhaps because Kenyan banks managers could have either sufficient expertise or enough incentive schemes to opt for profit maximization as opposed to self-enrichment.

This finding implied that for every unit increase in revenue diversification level financial performance moves in the same direction. The ramification is that revenue diversification could help a bank in eliminating the unevenness that could emerge from geographical reach, product-process innovation, exploitation of economies of scale and scope, reap the benefit of advanced technology, distribution of risk and capital mobilization. Seemingly, diversification has opened the door for banks to earn fees and commissions from investment banking, insurance agency, securities brokerage and other non-traditional financial services. This implied that Kenyan banks embrace multiple revenue-bearing activities, by complementing the traditional interest-bearing activities with non-traditional interest-bearing activities, ostensibly to enhance financial performance.

Seemingly, with an increase in revenue sources, the level of total weighted exposure increases to a certain threshold, after which the relationship shrinks. For instance, the interest and non-interest diversification levels were 36 percent and 63 percent respectively, but each explained 37 percent of the variation in RoA. This implied that as banks engage in revenue diversification activities as the expansion strategy, the exposure level perhaps outweigh the diversification benefits, and as such, affects the financial performance in the short run while in the long-run it adjusts to equilibrium. Thus, this illustrated that diversification in revenue-generating activities brings along with additional cost aspects, management complexity and perhaps increased exposure associated with the new activities lines. This ultimately reduces the profit margin as well

as the returns on assets; however, the adverse diversification effect could be smoothened by non-interest income. The implication is that the returns generated from non-traditional banking activities could be inferior, but worthwhile compared to the exposure level taken by the commercial banks while engaging in excessive risk non-banking activities mix.

This study finding was consistent with previous studies that found a positive relationship between revenue diversification and financial performance (Staikouras & Wood, 2006; Chiorazzo et al., 2008; Sanya & Wolfe, 2011; DeYoung & Torna, 2013; Tarazi et al., 2013; Gambacorta et al., 2014; Brighi & Venturelli, 2015; Natalia et al., 2016; Saunders et al., 2014; and Guerry & Wallmeier, 2017). However, inconsistent with previous studies that found a negative relationship between revenue diversification and financial performance (DeYoung & Rice, 2004; Stiroh, 2004; Goddard et al., 2008; Lin, 2010; and Kiweu, 2012). The summary of the hypothesis tests related to the first objective (H_1) was as provided in Table 5.11.

Table 5.11: Summary of the Test Results Relating to the First Objective

First Objective	First Hypothesis	Test Results	Finding
Evaluate the effect of revenue diversification on financial performance of commercial banks in Kenya.	**Null hypothesis (H_1)**	**Ref: Tables (5.1 & 5.2)**	
	Revenue diversification does not significantly affect financial performance	Significant ($\beta \neq 0$, $p < .05$), **H_1: Rejected**	Revenue diversification significantly affects financial performance
	Sub-hypothesis (H_{11})	**Ref: Table 5.1**	
	Interest diversification does not significantly affect returns on assets	Significant β_1 and F-stat. ($\beta \neq 0$, $p < .05$), **H_{11}: Rejected**	Interest diversification significantly affects return on assets
	Sub-hypothesis (H_{12})	**Ref: Table 5.2**	
	Non-interest diversification does not significantly affect return on assets	Significant β_1 and F-stat. ($\beta \neq 0$, $p < .05$), **H_{12}: Rejected**	Non-interest diversification significantly affects the return on assets

Source: Research Findings 2021

5.6.2 Revenue Diversification, Technical Efficiency and Financial Performance

The second specific objective was to assess the technical efficiency mediation effect on the relationship between revenue diversification and financial performance of commercial banks in Kenya. The study addressed the objective through testing the second null hypothesis (H_2) that stated that technical efficiency does not significantly affect the relationship between revenue diversification and the financial performance of commercial banks in Kenya. Based on Baron and Kenny (1986) model, the first step found a positive significant relationship between returns on assets and both interest (β_1 = 6.27, p = .00) and non-interest (β_1 = 5.16, p = .00) diversification. These results were satisfactory to the study and as such, progressed the mediation assessment to the second step.

The second step found that technical efficiency related negatively and statistically insignificant with interest diversification (β_1 = -.081, p = .468), but positively and significantly with non-interest diversification (β_2 = .257, p =.01). The study dropped interest diversification from the mediation assessment process, but non-interest diversification satisfied the second condition and progressed to the third step. The third step found an insignificant relationship between the returns on assets and the technical efficiency (β_1 = 1.36, p = .06). The insignificance implied the third step was not satisfactory and the study terminated the assessment process since mediation was not viable. Therefore, the study failed to reject the second null hypothesis (H_2) and concluded that technical efficiency does not mediate the relationship between revenue diversification and financial performance of commercial banks in Kenya.

This finding provided supporting evidence that technical efficiency is not a channel through which revenue diversification could transmit its effect to enhance financial

performance. That is, the technical efficiency level could not catalyze the effect on diversification and importantly, revenue diversification strategy could become beneficial in absence of a technically efficient intermediation process. This implied that banks efficiency in the mobilization of deposits, capital and reserves and using labour to transform into loans and other investments do not matters. There are two fold-implication resulting from these findings: Firstly, technical efficiency does not mediate the relationship between revenue diversification and financial performance. This finding contrasts with a finding by Gyan, Bakri and Rayenda (2017) which found technical efficiency as a mediator variable. However, the variables related positively to financial performance. This finding concurs with positive findings from earlier studies (Afsharian et al., 2015; Kaur & Kaur, 2013; Arafat et al., 2013; and Laeven & Levine, 2007).

Secondly, technical efficiency relates positively to financial performance, supports other earlier studies (Khan et al., 2016) and contrasts negative findings (Afsharian et al., 2015) that technical efficiency related more to a volatile asset with lower market value. Gyan et al. (2017) investigated the moderation effects of efficiency on a diversification-performance relationship using panel data from 319 firms. The study found a positive relationship, however, not as a moderating variable, but as an intervening variable. Nguyen (2018) found that diversified banks had lower cost efficiency, while fund-diversified banks enjoyed higher profit efficiency and more asset-diversified banks enjoyed only higher persistent profit efficiency. Kaur and Kaur (2013) found a positive and significant impact of technical efficiency on profitability. The summary of the finding was as shown in Table 5.12.

Table 5.12: Summary of Hypothesis Tests Relating to the Second Objective

Objective	Hypothesis	Baron's Steps	Research Finding
Assess the technical efficiency mediation effect on the relationship between revenue diversification and financial performance	H_2: Technical efficiency does not mediate the relationship between revenue diversification and the financial performance	**Step 1(Ref: Table 5.5)**	
		Significant ($\beta \neq 0$, $p < .05$), **Verdict**: satisfied	Interest diversification significantly affects returns on assets
		Step 1(Ref: Table 5.6)	
		Significant ($\beta \neq 0$, $p < .05$) **Verdict:** satisfied	Non-interest diversification significantly affects returns on assets
		Step 2(Ref: Table 5.7)	
		Insignificant ($\beta \neq 0$, $p > .05$) **Verdict:** violated	Interest diversification does not significantly affect technical efficiency
		Step 2(Ref: Table 5.8)	
		Significant ($\beta \neq 0$, $p < .05$), **Verdict:** satisfied	Non-interest diversification significantly affects technical efficiency
		Step 3 (Ref: Table 5.9)	
		Insignificant (β_1) ($\beta \neq 0$, $p > .05$), **Verdict:** violated	Technical efficiency does not significantly affect return on assets
		Step 4: Terminated	
		Steps 1-3 violated	No mediation effect

Source: Research Findings 2021

5.6.3 Revenue Diversification, Size and Financial Performance

The third specific objective assessed the size moderation effect on the relationship between revenue diversification and financial performance. The study addressed this objective through testing the third null hypothesis (H_3) that stated that size does not moderate the relationship between revenue diversification and financial performance of commercial banks in Kenya. The regression results revealed mixed findings: first, that

return on assets exhibited a positive significant relationship with both interest diversification (β_1 = 3.63, p = .035) and size (β_2 = .56, p = .00), but insignificant interaction term (β_3 = .049, p = .836). The insignificance of the interactive terms showed that there was no notable change in the inferential statistics and as such, the moderation effect of a size never occurred. Thus, size does not mediate the relationship between interest diversification and return on assets. However, the variable related positively to returns on assets. Secondly, return on assets exhibited negative insignificant relationship with non-interest diversification (β_1 = -.49, P = .813), positive significant with size (β_2 = .64, p = .00) and a negative significant interaction term effect (β_3 = -.69, p = .022).

The significance of the interactive terms showed that there was a notable change in the inferential statistics and as such, moderation effect occurred. Thus, size moderates the relationship between non-interest diversification and return on assets. Large banks outperform and enjoy larger market share attributable to better decision-making, being resourceful, domineering bargaining power; supra financial position and efficiency in operations, as well as fixed cost controls (Boateng et al., 2013). The concept of size is essential to banks because it enables diversification of risks and enhances managerial competence whilst gaining other benefits associated with economies of scale (Olweny & Shipho, 2011). That is, a forward-looking commercial bank attempts to increase its capacity through consolidation — mergers and acquisitions —to gain a competitive edge over the competition by leveraging on average cost reduction per unit to enhancing profitability (Babalola & Abiola, 2013).

The finding concurred with other previous studies that found a positive linear relationship between size and profitability, but not as a moderator on the relationship between revenue diversification and financial performance (Lepetit et al., 2008; Muhindi & Ngaba, 2018).

Muhindi and Ngaba (2018) found a positive relationship between size and financial performance. The research found that a negative indirect exposure effect for large firms outweighs the positive direct exposure effects, however, inconsistent with those studies, which saw a negative moderation in the relationship between revenue diversification and financial performance (Goddard et al. 2008; Mulwa & Kosgei, 2016). Size correlates with firm performance through economies of scale and economies of scope. Compared to small firms, large firms tend to have larger market shares because of better bargaining power, superior financial position, and more efficient cost control. Thus, diversified firms can have higher returns because diversified firms normally have a larger size than stand-alone ones. As a result, the revised interactive regression includes the size variable to isolate the potential effect (Rwegasira & Li, 2008). The summary results of the hypothesis testing relating to the third specific objective were as presented in Table 5.13.

Table 5.13: Summary of the Tests Results Relating to the Third Objective

Objective	**Hypothesis**	**Results Verdict**	**Finding**
Evaluate the size moderation effect on the relationship between revenue diversification, and financial performance of commercial banks in Kenya.	**H_3**: Size does not moderate the relationship between revenue diversification and the financial performance	**Ref: Table 5.8**	
		Significant β_1 Significant β_2 Insignificant β_3 **Verdict:** violated	Size does not moderate the relationship between interest diversification and return on assets
		Ref: Table 5.9	
		Insignificant β_1 Significant β_2 Significant β_3 **Verdict:** satisfied	Size moderates the relationship between non-interest diversification and returns on assets

Source: Research Findings 2021

5.6.4 Revenue Diversification, Technical Efficiency, Size and Financial Performance

The fourth objective evaluated the joint effect of revenue diversification, technical efficiency and size on financial performance of commercial banks in Kenya. The study addressed through testing for the fourth null hypothesis (H_4), which stated that jointly revenue diversification, technical efficiency and size do not significantly affect financial performance. The results reveal that jointly interest diversification, non-interest diversification, technical efficiency and size accounts for 46 percent of the variation in return on assets with statistical significance ($\bar{R}^2 = .46$, $F(5, 415) = 8.62$, $p = .00$). This implied that the variables interlink each other closely such that the remaining 48 percent of the variation in return on assets accounted for by other variables not included in the prediction model. The regression coefficient showed that return on assets related positively with all the independent variables.

These provided empirical evidence to justify why banks diversify into different activities. These findings meant that with an increase in interest diversification, non-interest diversification, technical efficiency and size the predicted return on assets increases or moves in the same direction proportionately. These findings provide enough evidence that jointly revenue diversification, technical efficiency and size significantly affect financial performance of commercial banks in Kenya. Firstly, return on assets exhibited a positive significant relationship with interest diversification ($\beta_1 = 3.26$, $p = .03$) but insignificant with non-interest diversification ($\beta_2 = 2.53$, $p = .06$). These results were consistent with previous studies which found a positive relationship between revenue diversification and financial performance (Sanya & Wolfe, 2011; DeYoung & Torna, 2013; Tarazi et al., 2013; Gambacorta et al., 2014; Brighi & Venturelli, 2015; Natalia et

al., 2016; Saunders et al., 2014; and Guerry & Wallmeier, 2017). However, the finding contrasted with those studies that found a negative relationship between revenue diversification and financial performance (DeYoung & Rice, 2004; Stiroh, 2004; Goddard et al., 2008; Lin, 2010; Kiweu, 2012; and Mulwa & Kosgei, 2016). Secondly, return on assets related positively but insignificant with technical efficiency (β_3 =1.173, p = .08). This finding concurred with studies that found a positive relationship (Kaur & Kaur, 2013; Arafat et al., 2013; Laeven & Levine, 2007; Afsharian et al., 2015; Gyan et al., 2017; and Nguyen, 2018). Thirdly return on assets related positively and significant with size (β_4 = .53, p = .000). The finding concurred with studies that found positive between size and profitability (Lepetit et al., 2008; and Muhindi & Ngaba, 2018) but inconsistent with those studies that found negative (Goddard et al. 2008; Rwegasira & Li, 2008; and Mulwa & Kosgei, 2016).

The positive finding supports the resource-based view theory, which suggests that firms with more endowment of resources tend to diversify into different business lines, hopefully, to enhance or smoothen profitability. In the case of commercial banks, the analogy seemed supported. That is the assumption of business expansion means more assets, skills and technology, which perhaps increases banks complexity, costs and related expenses as well as diseconomies of scale as the aftermath of firms increase in both vertical and horizontal lines. A larger commercial bank in terms of soft and physical assets, capital and reserves, customers' deposits and the number of deposit and loan accounts will opt and diversify into several banking activities that generate different revenue lines using diversification as a strategy. Thus, this increases the profitability of commercial banks and the exposure does outbursts the diversification benefits and the relationship with financial performance become positive. The summary of objective/hypothesis four was as presented in Table 5.14.

Table 5.14: Summary of the Test Results Relating to the Fourth Objective

Objective	Hypothesis	Results/Verdict	Research Finding
Evaluate the joint effect of revenue diversification, technical efficiency, and size on financial performance of commercial banks in Kenya.	H_4: Revenue diversification, technical efficiency, and size jointly do not significantly affect financial performance	**Ref: Table 5.10** Significant β_1 Insignificant β_2 Insignificant β_3 Significant β_4 Significant F-stat. $R^2 = .52$, $\bar{R}^2 = .46$ **Verdict:** **H_4:** Rejected	Jointly revenue diversification, technical efficiency, and size significantly affect financial performance of commercial banks in Kenya

Source: Research Findings 2021

Table 5.14 shows that jointly revenue diversification, technical efficiency and size significantly affect financial performance of commercial banks in Kenya. While a bank engages in more banking activities, another unrelated line of activities could cushion the risk associated with a given stream of revenue. Diversification engagement expands the size of a bank both vertically and horizontally, which then increases revenues generated especially when the optimum possible outputs produced from the least inputs.

5.6.5 Summary of the Four Null Hypotheses Tests Results

In summary, the findings of this study precisely demonstrated that revenue diversification significantly affects financial performance of commercial banks in Kenya (H_1). Secondly, technical efficiency does not mediate the relationship between revenue diversification and financial performance (H_2). Thirdly, size moderates non-interest (not interest) diversification and financial performance (H_3). Fourthly, jointly revenue diversification, technical efficiency and size significantly affect financial performance of commercial banks in Kenya (H_4).

CHAPTER SIX: SUMMARY, CONCLUSIONS AND IMPLICATIONS

6.1 Introduction

This chapter presents a summary of the study, the key research findings, conclusions and implications to the knowledge, policy and practice, limitation and suggestions for future research.

6.2 Summary of the Research Findings

The primary objective of this study was to assess the relationship between revenue diversification, technical efficiency, size and financial performance of commercial banks in Kenya. To achieve the aforementioned, the study assessed the four conceptualized variables; revenue diversification as the independent variable, technical efficiency as the mediating variable, size as the moderating variable and financial performance as the dependent variable. Ordinarily, a commercial banking operation generates revenue from the traditional banking activities and complemented by revenues generated from the non-traditional banking activities. The traditional banking activities are the funded intermediation banking activities held in the banking books such as deposits collection, loan creation and payments. These activities generate revenue that collectively constitutes the interest component, and consists of interests earned from loans and advances, government securities, deposits and other placements, and other interest incomes. Non-traditional banking activities are non-funded activities that generate non-interest components, comprising fees and commissions on loans and advances, other fees and commissions, foreign exchange trading earnings and dividend earnings from investments, and other non-interest income.

This study adopted revenue diversification as the predictor variable in the hypothetical model. The study generated each commercial bank's revenue diversification index for each year using the Herfindahl-Hirschman Index spanning from 2009 to 2018. The variable return on assets ratio formed the independent variable, computed as the ratio of earnings before interest and tax over total assets. The mediating variable was technical efficiency, measured using the data envelopment analysis approaches. The technical efficiency index leaned towards the input-output intermediation that considers deposits, labour, capital and reserve as constituting input, while loans and investments represent the output. The moderating variable was size a summation of the weighted composite index of net assets, customer deposits, core capital, numbers of loans and deposits accounts in a weighted ratio of 3:3:3:.05:.05, respectively.

Resource-based theory anchored this study and supported by market-power and agency theories with the assumption that the main objective of a bank is to maximize profits. Banks more than often, own and control some untapped resources that have failed or underutilized in the market. The resources based theory assumes that a bank could be motivated by the availability of untapped resources to diversify into different business activities that allow the bank to penetrates a new market and expands its capital base, which often results in a size increase. The theory links diversification as a strategy of applying the bank's untapped resources such as capital, skills, technology, innovative products and services in a profitable but related activities line, which use the same or similar resources. These related banking activities include engaging in bancassurance, foreign exchange trading, investments and other off-balance sheet items and activities. The market power theory suggests that a firm uses market power to outcompete competition while producing optimally (efficient) despite management complexity associated with the agency problem.

The study adopted positivism research philosophy as it strived to test for the series of quantitative hypotheses to assess the four specific objectives. The study considered the philosophical orientation appropriate because of the overwhelming evidence that supports the study's research question with more definite goals for hypothesis testing. Besides, the study variables were measured using ratios or rather were matric variables and the inferences statistic were based on the hypothesis test results about the relationships among the study variables. This study adopted a paned data descriptive design because the hypotheses were clearly stated and aligned with the investigation of the main research question. This study was a census that targeted all registered and insured commercial banks in Kenya, over the ten-year study period. The study used secondary data collected from the central bank of Kenya database and transformed it into panel data as shown in Appendix II, Table A_2. The study generated descriptive statistics to provide a bird's view of the research data. These included mean and standard deviations, maximum and minimum, skewness and excess fisher's kurtosis. Further, to assess the linear regression assumption, the study performed the panel model specifications and diagnostics tests, which included outliers, data stationarity, model suitability and stability tests, and diagnostic tests on regression assumptions such as linearity, normality, multicollinearity, autocorrelation, and homogeneity. The inferential statistics generated were from correlation analysis and panel least square regression analysis. The mediation and moderation steps suggested by Baron and Kenny (1986) s' were followed in the assessment.

As earlier alluded, the objective of this study was to establish the relationship between revenue diversification, technical efficiency, size and financial performance of commercial banks in Kenya. The first specific objective evaluated the effect of revenue diversification on financial performance, evaluated by testing the first null hypothesis

(H_1) using the panel least square regression model**.** The second specific objective assessed the mediation effect of technical efficiency on the relationship between revenue diversification and financial performance. The study evaluated through testing the second null hypothesis (H_2) with the guidance of the mediation assessment process proposed by Baron and Kenny (1986). The third specific objective assessed the moderation effect of size on the relationship between revenue diversification and financial performance. The study assessed using the third null hypothesis (H_3) with the guidance of the moderation assessment process, proposed by Baron and Kenny (1986). The fourth specific objective evaluated the joint effect of revenue diversification, technical efficiency, and size on financial performance. The study evaluated the fourth null hypothesis (H_4) using multiple panel least square regression.

The descriptive statistics revealed that diversification level for interest and non-interest 36 percent ($\bar{x}$ = .356) and 63 percent ($\bar{x}$ = .627), respectively. This revealed that banks were heterogeneous in revenue generation activities from both interest-bearing and non-interest-bearing activities. Further, the analysis showed that on average, banks' returns on assets were 2 percent ($\bar{x}$ = 2.03) during the period, revealing that banks had different earning abilities. While other banks can earn 10 percent times on the assets, some were worse-off by 32 percent times of its assets. Further, results disclosed that banks were about 70 percent ($\bar{x}$ = .697) technically efficient (or wastage of 30 percent (1-70)) of the possible inputs used to produce the optimum possible output. This meant that banks were optimally generating revenue given the out-put input ratio and, as such, were highly efficient in intermediation processes. Finally, the size was about 2.4 percent ($\bar{x}$ = 2.378) with the smallest bank exhibited a scale of 0.7 percent, while the largest score was 15 percent. This revealed that banks in Kenya were heterogeneous in terms of size, with the biggest bank being about 15 times the smaller bank.

The first specific objective evaluated the effect of revenue diversification on financial performance. The study addressed the first null hypothesis (H_1) that stated that revenue diversification does not significantly affect financial performance. The study used panel least square and found a positive significant relationship between returns on assets and both interest diversification ($\beta_1 = 6.27$, $p = .00$) and non-interest diversification ($\beta_2 = 5.16$, $p = .00$). Since the statistical coefficient values were all significantly different from zero ($\beta \neq 0$, $p < .05$), the study rejected the first null hypothesis (H_1) and concluded that revenue diversification significantly affects financial performance of commercial banks in Kenya.

The second specific objective assessed the mediation effect of technical efficiency on the relationship between revenue diversification and financial performance. The second null hypothesis (H_2) tested the technical efficiency mediation effect using the four steps proposed by Baron and Kenny (1986). The results revealed that in the first step, returns on assets related significantly with both interest ($\beta_1 = 6.27$, $p = .00$) and non-interest ($\beta_2 = 5.16$, $p = .00$) diversification. Secondly, technical efficiency related insignificantly with interest diversification ($\beta_1 = -.082$, $p = .47$) and significantly with non-interest diversification ($\beta_2 = .26$, $p = .011$). Thirdly, technical efficiency related insignificantly with financial performance ($\beta_1 = 1.36$, $p = .062$). Since the assessment condition required that steps one through three (1-3) must be statistically significant, step three violated the conditions. Thus, the study terminated the mediation assessment progression to the fourth step because the mediation effect was not viable. Based on these results, the study failed to reject the second specific null hypothesis (H_2) and stated that technical efficiency does not mediate the relationship between revenue diversification and financial performance of commercial banks in Kenya.

The third objective evaluated the moderation effect of size on the relationship between revenue diversification and financial performance. The third specific null hypothesis (H_3) tested the moderation effect of size on the relationship between revenue diversification and financial performance. The study found that return on assets related significantly with both interest diversification ($\beta_1 = 3.63$, $p = .035$) and size ($\beta_2 = .56$, $p = .00$) in presence of insignificant interactive terms ($\beta_3 = .049$, $p = .84$). The insignificant interaction terms implied that the mediation effect never occurred. Secondly, return on assets related insignificantly with interest diversification ($\beta_1 = -.49$, $p = .813$) and significant with size ($\beta_2 = .64$, $p = .00$) in presence of significant interactive terms ($\beta_3 = .69$, $p = .02$). Based on these results, the study found that size moderates the relationships between non-interest (not interest) diversification and financial performance of commercial banks in Kenya.

The fourth specific objective evaluated the joint effect of revenue diversification, technical efficiency and size on financial performance. The fourth null hypothesis (H_4) tested the joint effect of revenue diversification, technical efficiency and size on financial performance and the study found that the four variables jointly accounted for 46 percent of the variation in return on assets with statistical significance ($R^2 = .46$, $F(4, 366) = 8.52$, $p = .00$). In addition, the model coefficients revealed that financial performance related significantly with both interest diversification ($\beta_1 = 3.257$, $p = .029$) and size ($\beta_4 = .53$, $p = .00$), but insignificant with non-interest diversification ($\beta_2 = 2.53$, $p = .0596$) and technical efficiency ($\beta_3 = 1.173$, $p = 0795$). Based on the overall model fitness coefficient results, the study rejected the fourth null hypothesis and found that jointly revenue diversification, technical efficiency and size significantly affect financial performance of commercial banks in Kenya.

6.3 Conclusions of the Study

The primary objective of this study was to assess the relationship between revenue diversification, technical efficiency, size and financial performance of commercial banks in Kenya. That is, the study assessed the relationship of the four conceptualized variables; revenue diversification as the independent variable, technical efficiency as the mediating variable, size as the moderating variable and financial performance as the dependent variable. Based on the null hypotheses tests evaluation the study presents the conclusion chronologically order of hypothesis finings.

Based on the first null hypothesis (H_1) test results, the study concluded that revenue diversification significantly affects financial performance of commercial banks in Kenya. Concisely, the empirical analysis disclosed that during the study period, commercial banks were moderately diversified in both interest and non-interest generating activities. Although the diversification level varied, the positive association confirmed that banks embraced revenue diversification as a business strategy to improve financial performance. During the study period, both the interest generating and non-interest generating activities complemented each other, which combined smoothened the total revenue curve and subsequently, reduced volatility in return on assets. Perhaps the logical thinking is that stability in return on assets could be associated with the stability in revenue diversification. Therefore, this study assists managers for a commercial bank to appreciate the linkage untapped between resources availability, revenue diversification and complexity in management function with concerted efforts to enhance financial performance.

Based on the second null hypothesis (H_2) test results, the study concluded that technical efficiency does not mediate the relationship between revenue diversification and the

financial performance of commercial banks in Kenya. That is, the significant direct effect of technical efficiency on return on assets became statistically insignificant in the absence of revenue diversification, implying that the mediation effect was not possible. This provided a shred of supporting evidence that technical efficiency is not a channel through which banks could transmit revenue diversification effect to enhance profitability. That is, at a 70% technical efficiency level the diversification effect could not change or catalyze the relationship. In other words, revenue diversification strategy becomes beneficial to commercial banks despite the technical efficiency in the intermediation process.

Based on the third null hypothesis (H_3) test results, the study concluded that size moderates the relationship between non-interest (not interest) diversification and financial performance. That is the coefficient of returns on assets and interest diversification relationship remained statistically significant in the presence of insignificant interaction terms coefficient. Nevertheless, relationships between non-interest diversification and return on assets become insignificant in the presence of significant interaction terms. The repercussion of this stand is that commercial banks need to step up the optimal and appropriate bank size to ensure operative and proficient planning, investment, sponsoring and working activities that transform into better financial performance. The size of a commercial bank indicates the bank's reliance on collected deposits as well as the extent of involvement in market-based activities. A forward-looking commercial bank attempts to increase its size through mergers and acquisitions to gain a competitive edge over the competition, by leveraging on average cost reduction per unit while enhancing technical efficiency, capital base and market share.

Finally, based on the overall model the fourth null hypothesis (H_4) test results indicated that jointly revenue diversification, technical efficiency and size significantly affect the financial performance of commercial banks of Kenya. The implication is that commercial banks that embrace revenue diversification as a comprehensive strategy with an enhanced level of technical efficiency in the intermediation process, and mindful of the benefits of optimal size performs well financially. The implication is that larger banks influence diversification decisions relating to revenue-generating activities, and takes on more risk projects with high returns. This makes larger banks potentially more profitable than smaller commercial banks, despite the cost scale and management complexity. Diversification expands the size of the bank, which in turn, increases revenue generation given the optimum possible outputs produced, from the least combination of inputs.

6.4 Contributions of the Study

The findings of this study contribute to the puddle of knowledge in the field of banking and finance especially on the concepts of revenue diversification, technical efficiency, size and financial performance concepts. The study creates an outstanding support to the resource-based theory, by displaying the interface and interlinking mechanism amid the four study's variables. Further, policymakers and practitioners in the banking industry with several policy implications for the commercial banks' management, bank regulators and current as well as potential investors.

6.4.1 Contributions of the Study to Knowledge

The study demystified revenue diversification as a beneficial strategy in the context of developing economies—the higher the revenue diversifications level for a bank, the higher the financial indicators reports. The findings support the bulk of theoretical and empirical knowledge in terms of the conceptual framework, empirical analysis and

methodological techniques on revenue diversification, technical efficiency, size and financial performance. The scarcities of studies that conceptualized the four concepts together at the same time that make this study an outstanding and perhaps the first study ever. Further, the decomposition of revenue streams provided clarity and delineation of exposures associated with each stream while substantively unearthing the relationship puzzle between diversification and financial performance. Besides, the spurring contribution that jointly all the variables predicted positively financial performance appealing and further highlights resources based theory as a potential theory cutting across the variables. That is empirically an exciting finding considering the tenets of resources based theory and the shifting of banks activities to non-banking activities.

This study finding contributes to the pool of literature that found a positive relationship between revenue diversification and financial performance (Githaiga et al., 2019; Kumar et al., 2019; Mundi, 2019; Ndungu & Muturi, 2019; Cetin, 2018; Nisar et al., 2018; Belguith & Bellouma, 2017). However, contrasts others with negative findings (Tran et al., 2020; Nguyen, 2019; Gupta & Sen, 2016; Mulwa & Kosgei, 2016). Further, the study found a moderation effect of size on the relationship between non-interest diversification and financial performance, which concurred with previous studies finding (Bonin et al., 2004; Janoudi, 2014; and Sanderson & Pierre 2016). The study contributes in terms of the measurements model used to capture the concepts. This study used reversed Herfindahl-Hirschman Index to capture decomposed revenue diversification, which previous studies ignored the decomposition aspect (Tran et al., 2020; Githaiga et al., 2019; Natalia et al., 2016; Mulwa & Kosgei, 2016; Gambacorta et al., 2014; DeYoung & Torna, 2013; Kiweu, 2012; and Sanya & Wolfe, 2011). The return on assets indicator proxied financial performance as opposed to the conventional return on equity measure

that favour shareholders (Almazari, 2014; Olusegun et al., 2013; Rozzani & Rahman, 2013; Goddard et al., 2011; Colangelo & Inklaar, 2010; and Bikker, 2010).

A unique conceptual framework, mediation and moderation effect expands the understanding in the theory of finance. The third influence of the thesis relates to the introduction of technical efficiency uniquely as a mediator and measured using DEA following previous studies (Izzeldin et al., 2020; Adesanya & Abere, 2020; Sharma, 2018; and Banker et al., 1984). Extends the literature and theoretical arguments that size moderates the relationship between non-interest diversification and financial performance. The assessment of size as moderator and use of weighted composite model profound makes the study outstanding in contribution in linking diversification to the performance line with previous studies (Al-Arif & Aw-waliyah, 2018; Laeven et al., 2016; and Evgeni, 2012). Several studies appraised the direct effect of diversification on financial performance ending up contradicting each other and inconclusive (Coelli et al., 2005; Das & Kumbhakar, 2012; Titko et al., 2014). This study adopted the composite measures to avert or address the consequence of using a single measure since previous studies' findings conflicted because of a focus on different attributes leading to contradictory conclusions. The use of the composite measures has reduced the conflicting previous literature inconsistencies.

6.4.2 Contributions of the Study to Policy and Practice

The findings of this study have several implications to the banking regulators, managers and shareholders, depositors, borrowers and investors in general. Bank managers and the board of management could be interested in the direct effect of revenue diversification on bank financial performance. This relationship provides a profound pointer in the management decision process. That is, the fact that a positive relationship exists between

revenue diversification and financial performance shows that the decisions taken by managers in oversight roles on banking activities directly influence the financial performance. The diversified and larger bank has a better chance of withstanding a financial shock because the revenue stream can theoretically balance out the impact of adverse inertia with a stable capital and earnings of other business streams. Thus, this begs on the assumption that larger banks indeed diversify and are technical efficient in the process of intermediation across a range of business lines. For instance, if a bank constitutes a proper combination of revenue-generating activities, it would lead to an optimal output ratio, which in the end translates into better financial performance.

Therefore, this study assists commercial bank management to appreciate the linkages between diversification based on the availability of untapped resources, market activities and complexity in management function with bank financial performance. The fact that technical efficiency ultimately relates to both revenue diversification and bank financial performance could be an indicator that commercial banks' functional input-out trade-off and management thereof do have a significant impact on revenue rebalancing and the decision-making process. Thus, an adequate revenue diversification, technical efficiency and appropriate manageable size aligned with the interest of the agents with those of the principal (shareholders).

The banking regulator could find the current study findings useful while undertaking the superintendent starring role and production of prudential guiding principle on revenue generation activities and the restrictions of banking activities. For instance, the bigger size of a bank could be appreciated in the banking business as it enables risk diversification, management competence and scale economies. Small banks could benefit from a more responsive management model and thus, both small and large banks

need a level of tolerance and close supervision. Therefore, from the regulator's perspective, considerably large size bank complexity requires adequate management and regulatory resources proportionately to the size of the bank. In this regard, there is a need for diversification doctrines and apparatuses to improve bank financial performance. Prudential tariffs transparency, interest spread guidelines, and general bank regulation by the supervisory body requires tightening to safeguard effective expenses administration of banks and value-added financial performance.

The outcomes of this study could be valuable to stakeholders—the owners and bearers—of banks obligation and burden of the most significant risk especially when a bank fails to execute as per pledged commitments. Banks depositors are in frontlines and could face embarrassments and losses each time a bank implements a weak revenue combination matrix and engage in meagre funding activities, which lead to losses, statutory management and finally insolvency. This study demonstrates the bond between revenue streams diversification apparatuses, technical output-input trade-off and appropriate size that converts to better bank financial performance, which benefits all stakeholders. The banking shareholders and analysist have welcomed acquisitions that partakes a robust and realizable cost combined effect and to a lesser extent, revenue concerted effort, which targets profit enhancement into their valuation model if it appears credible.

6.5 Limitations of the Study

This study utilized panel data extracted from registered and active commercial banks that had their financial performances published during the study period, spanning 2009 to 2018. The discussion and interpretation were limited to relationships between revenue diversification, technical efficiency and size impact on commercial banks' financial performance. It does not review policies related to a revenue source despite the critical

need for the public interest. Similarly, the commercial bank structure in Kenya is unique in terms of ownership structure, divergence in accounting treatment of various sources of income, faith or beliefs and the level of financial liberalization. Thus, generalization of the findings to entities not subject to the regulatory framework context with different characteristics is limited.

The study used secondary data sourced from the central bank database, specifically the annual supervisory reports. These are general-purpose reports for monitoring the general financial healthiness and soundness of the banking sector. Therefore, the reliability and validity of the results could be to the extent of any limitation observed and reported therein; however, the study confirmed manually the variables measurements. Moreover, the study embraced the descriptive research design and the findings of this study remains boundless to the attributes used in the study with a focus on revenue diversification, technical efficiency and size; however, there are further characteristics of the variables that can hypothetically affect the relationships tested.

6.6 Suggestions for Future Research

This study hypothesized on revenue diversification effect on financial performance and used only the Herfindahl-Hirschman index in the context of the banking sector. Future research using other measures could corroborate the findings especially a study on unrelated types of diversification could further enhance the understanding. Considering the literature divide, a qualitative analysis is pertinent to clarify some of the conjectures and indeed, test the hypotheses in literature. Further, there is a need for research on diversification across non-financial institutions such as industries among others.

The current research focused on commercial banks in Kenya and a similar study could replication on other financial institutions like insurance companies, housing finance

companies, microfinance institutions and foreign exchange bureaus comes in handy. This study considered two bank-specific factors; technical efficiency and size, however, there is a need to undertake an independent survey of internal and external factors, which influence diversification and financial performance. Therefore, a broader study could be desirable. Based on the research findings, the study makes several prepositions for future research.

First, the introduction of different variables for testing the mediation and moderation effect on the relationship between revenue diversification and financial performance could be desirous. Again, the present study used a computable measure and on a single financial performance indicator, return on assets. As such, comparable research grounded on both qualitative and quantitative measures of performance with more financial performance indicators such as return on equity, return on capital, net interest margin, etc. may support and broaden the scope of the current research.

Finally, Islamic commercial banks offer sharia-compliant in line with Islamic core principles. These institutions are still at the introduction phase of establishing financial services in Kenya; therefore, the study suggests independent research on main income-generating activities in line with Islamic principles. Although it is common knowledge that banks are in the banking business, it can be possible that public-owned commercial banks have different motives in the industry, for instance to moderate costs of transaction, interest and normalize the distribution of lending. The study suggests further study on banks' motives and the ownership structure effects on profitability.

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APPENDICES

Appendix I:

This study utilized panel data extracted from the CBK annual reports from 2009 to 2018. The report covers the financial and other performance indicators of all registered commercial banks under the jurisdiction of CBK and available for public scrutiny. It provides financial information for each commercial bank as well as the sector. The report has three distinctive sections: balance sheet, profit and loss accounts, and other disclosures. These sections deemed adequate to answer the research question. Table A_1 provides the data capture form used.

Table A_1: Data capture form for the study period (2009 -2018)

Variables	Indicators	Study Period									
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Revenue Diversification	**Weighted revenue diversification index**										
	Interest Diversification Index (*HHI_{II}*)										
	- Loans & Advances income										
	- Government securities										
	- Deposits & placements income										
	- Other Interest income										
	Non-interest Diversification (*HHI_{NII}*)										
	- Fees & comm. on loans & advance										
	- Other fees & commissions										
	- Foreign exchange income										
	- Dividend income										
	- Other income										
Technical Efficiency	***DEA* Weighted composite index**										
	Inputs										
	- Deposits										
	- Capital										
	- Labour										
	Outputs										
	- Loans										
	- Investments										
Size	**Size Weighted Composite Index**										
	- Net assets,										
	- Customer deposits,										
	- Capital and reserves,										
	- Number of loans accounts										
	- Number of deposits accounts										
Financial Performance	**Return on Assets (*RoA*)**										
	- Earnings Before Interest & Tax										
	- Average total assets (TA)										

Appendix II

Table A_2: The Panel Data for the Study Period (2009-2018) for HHIII, HHINII, TE, S and RoA

Years	*Banks*	*HHI_{II}*	*HHI_{NII}*	*TE*	*S*	*RoA*
2009	ABC	0.27	0.66	0.59	0.59	0.03
2010	ABC	0.23	0.64	0.80	0.60	0.05
2011	ABC	0.30	0.64	1.00	0.50	0.03
2012	ABC	0.35	0.68	0.99	0.63	0.03
2013	ABC	0.38	0.71	0.87	0.70	0.03
2014	ABC	0.39	0.71	0.08	0.63	0.01
2015	ABC	0.39	0.71	0.37	0.63	0.02
2016	ABC	0.39	0.59	0.38	0.64	0.01
2017	ABC	0.25	0.58	0.68	0.59	0.01
2018	ABC	0.37	0.72	0.77	0.76	0.01
2009	BBK	0.39	0.66	0.51	6.68	0.05
2010	BBK	0.34	0.59	0.60	6.57	0.06
2011	BBK	0.40	0.60	0.76	6.94	0.05
2012	BBK	0.43	0.60	0.70	7.27	0.07
2013	BBK	0.46	0.63	0.76	7.65	0.06
2014	BBK	0.45	0.61	0.76	8.08	0.05
2015	BBK	0.37	0.65	0.58	8.90	0.05
2016	BBK	0.34	0.63	0.28	10.72	0.03
2017	BBK	0.36	0.57	0.40	12.23	0.04
2018	BBK	0.42	0.65	0.60	7.00	0.03
2009	BOA	0.34	0.71	0.49	0.99	0.02
2010	BOA	0.32	0.70	0.64	1.25	0.02
2011	BOA	0.26	0.57	0.75	1.40	0.01
2012	BOA	0.27	0.63	0.70	1.81	0.01
2013	BOA	0.33	0.72	0.92	1.77	0.02
2014	BOA	0.37	0.47	0.96	1.70	0.00
2015	BOA	0.44	0.76	0.58	1.42	-0.02
2016	BOA	0.36	0.69	0.56	1.24	0.00
2017	BOA	0.30	0.65	0.79	1.77	0.00
2018	BOA	0.35	0.73	1.00	1.83	0.00
2009	BOB	0.50	0.64	0.96	2.04	0.03
2010	BOB	0.49	0.54	1.00	1.99	0.06
2011	BOB	0.48	0.55	1.00	1.93	0.04
2012	BOB	0.43	0.60	1.00	1.92	0.04
2013	BOB	0.51	0.65	1.00	2.92	0.05
2014	BOB	0.50	0.49	1.00	2.56	0.04
2015	BOB	0.50	0.64	1.00	2.40	0.04
2016	BOB	0.48	0.08	1.00	1.83	0.05
2017	BOB	0.50	0.34	0.83	1.91	0.05
2018	BOB	0.50	0.58	0.66	1.58	0.04
2009	BOI	0.45	0.72	1.00	1.60	0.04
2010	BOI	0.49	0.71	1.00	1.55	0.05
2011	BOI	0.50	0.71	1.00	1.30	0.03
2012	BOI	0.50	0.66	1.00	1.16	0.02
2013	BOI	0.50	0.72	1.00	1.11	0.04
2014	BOI	0.51	0.72	1.00	1.15	0.04
2015	BOI	0.51	0.69	1.00	1.08	0.03
2016	BOI	0.48	0.67	1.00	1.17	0.05
2017	BOI	0.49	0.74	0.67	1.16	0.05
2018	BOI	0.51	0.73	0.73	1.15	0.04
2009	CBA	0.51	0.60	0.81	5.66	0.03
2010	CBA	0.48	0.58	0.96	5.90	0.04
2011	CBA	0.41	0.64	1.00	5.58	0.02
2012	CBA	0.47	0.71	1.00	5.12	0.04
2013	CBA	0.49	0.70	0.99	4.40	0.04
2014	CBA	0.46	0.65	0.69	4.08	0.03
2015	CBA	0.42	0.65	0.75	3.98	0.03
2016	CBA	0.41	0.70	0.50	3.60	0.03
2017	CBA	0.41	0.61	0.60	3.92	0.03
2018	CBA	0.51	0.57	0.88	6.05	0.03
2009	CFC	0.41	0.69	0.80	4.92	0.04
2010	CFC	0.24	0.72	1.00	5.10	0.04
2011	CFC/Stan	0.18	0.64	0.70	2.98	0.03
2012	CFC/Stan	0.24	0.68	0.87	5.01	0.02
2013	CFC/Stan	0.32	0.66	0.83	5.57	0.01
2014	CFC/Stan	0.44	0.66	0.86	4.92	0.04
2015	CFC/Stan	0.25	0.64	0.87	1.87	0.02
2016	CFC/Stan	0.42	0.67	0.62	5.43	0.01
2017	CFC/Stan	0.15	0.67	0.80	2.40	0.03
2018	CFC/Stan	0.52	0.63	0.64	7.00	0.04
2009	Chase	0.28	0.66	0.87	1.49	0.02
2010	Chase	0.30	0.75	0.44	1.10	0.02
2011	Chase	0.18	0.66	0.45	0.85	0.02
2012	Chase	0.63	0.56	0.30	2.84	0.03
2013	Chase	0.56	0.53	0.63	2.76	0.03
2014	Chase	0.57	0.58	0.93	2.83	0.03
2009	Citi	0.52	0.64	0.49	2.15	0.06
2010	Citi	0.52	0.68	0.53	2.56	0.05
2011	Citi	0.61	0.50	0.68	4.20	0.04
2012	Citi	0.37	0.40	1.00	0.07	0.10
2013	Citi	0.34	0.62	0.65	9.90	0.07
2014	Citi	0.29	0.61	1.00	0.26	0.05
2015	Citi	0.21	0.53	1.00	0.37	0.00
2016	Citi	0.29	0.64	1.00	0.50	0.06
2017	Citi	0.28	0.71	1.00	0.68	0.07
2018	Citi	0.21	0.69	1.00	0.41	0.06
2009	City	0.50	0.73	0.95	0.32	-0.01
2009	Conso	0.22	0.64	0.54	0.61	0.02
2010	Conso	0.22	0.69	0.42	0.49	-0.01
2011	Conso	0.30	0.60	0.80	9.83	-0.02
2012	Conso	0.27	0.60	0.75	8.91	0.04
2013	Conso	0.30	0.62	0.74	8.61	-0.02
2014	Conso	0.24	0.61	0.74	8.74	-0.03
2015	Conso	0.30	0.61	0.35	8.46	-0.03
2016	Conso	0.24	0.71	0.90	0.66	0.02
2017	Conso	0.22	0.59	0.92	0.23	0.01
2018	Conso	0.24	0.57	1.00	0.30	0.01
2009	Co-op	0.36	0.50	0.54	9.44	0.03
2010	Co-op	0.31	0.53	0.61	8.41	0.04
2011	Co-op	0.33	0.66	0.49	9.93	0.03
2012	Co-op	0.34	0.64	0.32	8.95	0.05
2013	Co-op	0.31	0.69	0.57	0.38	0.05
2014	Co-op	0.22	0.69	0.50	0.40	0.04
2015	Co-op	0.22	0.62	0.84	0.28	-0.02
2016	Co-op	0.26	0.64	0.73	0.27	0.05
2017	Co-op	0.32	0.68	0.78	0.28	0.04
2018	Co-op	0.28	0.70	0.62	0.29	0.04
2009	Credit	0.36	0.66	0.53	0.28	0.02
2010	Credit	0.43	0.46	0.24	0.29	0.01
2011	Credit	0.37	0.73	0.34	0.30	0.01
2012	Credit	0.25	0.71	0.53	0.41	0.01
2013	Credit	0.46	0.66	1.00	0.40	0.01
2014	Credit	0.52	0.54	0.91	0.32	-0.01
2015	Credit	0.49	0.73	1.00	0.46	0.01
2016	Credit	0.47	0.66	1.00	0.48	0.01
2017	Credit	0.47	0.72	1.00	0.47	0.01
2018	Credit	0.44	0.70	1.00	0.47	0.02
2009	DBK	0.43	0.66	0.66	0.50	0.02
2010	DBK	0.39	0.75	0.94	0.50	0.02
2011	DBK	0.51	0.66	1.00	0.37	0.01
2012	DBK	0.49	0.75	1.00	0.46	0.01
2013	DBK	0.45	0.71	1.00	6.72	0.02
2014	DBK	0.39	0.72	1.00	0.17	0.02
2015	DBK	0.48	0.61	0.02	0.10	0.04
2016	DBK	0.42	0.69	1.00	6.40	0.01
2017	DBK	0.26	0.68	0.95	5.32	0.00
2018	DBK	0.27	0.68	0.87	4.63	0.01
2017	DIB	0.30	0.68	0.92	4.10	0.05
2018	DIB	0.60	0.45	0.86	3.96	-0.32
2009	DTB	0.37	0.67	0.60	1.02	-0.17
2010	DTB	0.29	0.68	0.86	4.26	0.03
2011	DTB	0.19	0.71	0.97	3.77	0.03
2012	DTB	0.29	0.67	0.58	3.36	0.05
2013	DTB	0.30	0.69	0.74	3.39	0.05
2014	DTB	0.47	0.68	0.92	6.55	0.04
2015	DTB	0.02	0.42	1.00	0.10	-0.05
2016	DTB	0.16	0.55	1.00	0.14	0.04
2017	DTB	0.07	0.59	1.00	0.15	0.03
2018	DTB	0.16	0.55	0.69	0.15	0.03
2009	Dubai	0.04	0.58	0.34	0.14	0.01
2010	Dubai	0.09	0.65	0.54	0.15	0.00
2011	Dubai	0.62	0.68	0.28	1.19	0.01
2012	Dubai	0.36	0.66	0.78	1.42	-0.01
2013	Dubai	0.36	0.67	0.76	1.46	0.01
2014	Dubai	0.35	0.53	0.79	1.15	0.00
2009	ECB	0.46	0.64	0.60	9.85	0.02
2010	ECB	0.20	0.63	0.78	8.70	0.01
2011	ECB	0.22	0.65	0.91	9.79	-0.05

Years	Banks	HHI_{II}	HHI_{NII}	TE	S	RoA
2012	ECB	0.29	0.64	0.75	9.98	0.01
2013	ECB	0.30	0.67	0.32	9.09	-0.03
2014	ECB	0.25	0.49	0.49	8.44	0.07
2015	ECB	0.38	0.66	0.30	1.59	-0.08
2009	ECO	0.45	0.71	0.39	1.06	0.01
2010	ECO	0.33	0.06	0.83	0.40	0.01
2011	ECO	0.23	0.71	1.00	0.45	-0.05
2012	ECO	0.25	0.71	0.96	0.53	-0.03
2013	ECO	0.27	0.71	1.00	0.52	-0.01
2014	ECO	0.39	0.70	0.78	0.57	0.00
2015	ECO	0.41	0.65	0.43	0.53	-0.06
2016	ECO	0.25	0.65	0.43	0.35	-0.03
2017	ECO	0.47	0.64	0.78	9.73	0.00
2018	ECO	0.21	0.61	0.81	9.44	0.00
2009	Equity	0.18	0.53	0.58	1.90	0.06
2010	Equity	0.31	0.60	0.79	2.36	0.07
2011	Equity	0.23	0.58	0.68	2.06	0.06
2012	Equity	0.23	0.56	0.71	1.62	0.07
2013	Equity	0.21	0.51	0.75	1.42	0.08
2015	Equity	0.28	0.61	0.26	1.42	0.04
2014	Equity	0.29	0.56	0.65	1.34	0.07
2016	Equity	0.21	0.47	0.39	0.98	0.06
2017	Equity	0.23	0.41	0.51	1.71	0.06
2018	Equity	0.22	0.55	0.60	0.35	0.06
2009	Family	0.21	0.63	0.86	0.45	0.03
2010	Family	0.22	0.64	0.85	0.46	0.02
2011	Family	0.20	0.70	0.92	0.48	0.01
2012	Family	0.20	0.68	1.00	0.39	0.03
2013	Family	0.36	0.73	1.00	0.50	0.04
2014	Family	0.38	0.40	0.65	0.45	0.04
2015	Family	0.17	0.57	0.65	0.45	-0.02
2016	Family	0.41	0.70	0.80	0.74	0.01
2017	Family	0.45	0.72	0.66	0.69	-0.02
2018	Family	0.48	0.66	0.40	0.76	0.01
2009	FCB	0.56	0.74	0.91	0.97	-0.03
2010	FCB	0.51	0.72	0.78	1.07	-0.03
2011	FCB	0.41	0.58	0.00	0.49	0.01
2012	FCB	0.44	0.73	0.65	0.77	0.03
2013	FCB	0.46	0.73	0.67	0.85	0.02
2014	FCB	0.39	0.71	0.81	0.46	0.01
2015	FCB	0.38	0.71	0.77	0.48	0.03
2016	FCB	0.38	0.66	0.59	0.38	0.00
2017	FCB	0.31	0.64	0.63	0.40	0.01
2018	FCB	0.31	0.66	0.73	0.43	-0.02
2009	Fidelity	0.37	0.52	0.49	0.83	0.01
2010	Fidelity	0.43	0.73	0.71	1.09	0.05
2011	Fidelity	0.15	0.10	0.74	0.40	0.02
2012	Fidelity	0.11	0.58	0.66	0.45	0.01
2013	Fidelity	0.17	0.56	0.60	0.40	0.02
2014	Fidelity	0.01	0.54	0.69	0.40	-0.01
2015	Fidelity	0.43	0.61	0.68	0.41	0.02
2016	Fidelity	0.09	0.55	0.72	0.39	0.00
2009	Fina	0.27	0.39	0.32	0.34	0.00
2010	Fina	0.43	0.70	0.40	0.51	0.01
2011	Fina	0.36	0.73	0.89	0.50	0.02
2012	Fina	0.40	0.37	0.77	0.49	0.02
2013	Fina	0.43	0.58	0.77	0.52	0.02
2009	Giro	0.38	0.68	0.74	0.45	0.03
2010	Giro	0.36	0.68	1.00	0.40	0.03
2011	Giro	0.35	0.74	0.79	0.44	0.06
2012	Giro	0.35	0.74	0.50	0.50	0.03
2013	Giro	0.44	0.67	0.47	0.46	0.02
2014	Giro	0.26	0.48	0.64	0.64	0.03
2015	Giro	0.21	0.65	0.47	0.73	0.02
2016	Giro	0.23	0.43	0.42	0.80	0.04
2014	GTB	0.34	0.67	0.55	0.54	0.02
2015	GTB	0.61	0.57	0.74	3.42	0.06
2016	GTB	0.42	0.26	0.41	0.59	0.02
2017	GTB	0.43	0.66	0.71	0.49	0.01
2018	GTB	0.49	0.69	0.60	0.90	0.01
2009	Guardian	0.30	0.50	0.66	0.60	0.01
2010	Guardian	0.08	0.62	0.34	0.56	0.01
2011	Guardian	0.37	0.48	0.38	0.59	0.01
2012	Guardian	0.26	0.49	0.86	0.56	0.02
2013	Guardian	0.26	0.62	0.43	0.77	0.03
2014	Guardian	0.44	0.72	0.72	0.50	0.01
2015	Guardian	0.49	0.74	0.90	0.36	0.02
2016	Guardian	0.51	0.70	0.46	0.32	0.03
2017	Guardian	0.50	0.73	0.27	0.32	0.02
2018	Guardian	0.47	0.73	0.25	0.35	0.02
2009	Gulf	0.51	0.71	0.33	0.43	-0.02
2010	Gulf	0.45	0.37	0.84	0.40	0.00
2011	Gulf	0.47	0.73	0.88	0.42	0.01
2012	Gulf	0.55	0.72	0.35	0.44	0.03
2013	Gulf	0.52	0.70	0.30	0.53	0.03
2014	Gulf	0.43	0.71	0.88	0.47	0.04
2015	Gulf	0.44	0.72	0.81	0.45	0.03
2016	Gulf	0.50	0.71	1.00	0.40	0.01
2017	Gulf	0.51	0.73	0.91	0.39	0.01
2018	Gulf	0.50	0.60	0.25	0.48	0.03
2009	Habib	0.51	0.73	1.00	0.32	0.04
2010	Habib	0.27	0.61	1.00	1.48	0.06
2011	Habib	0.19	0.65	0.65	1.54	0.04
2012	Habib	0.18	0.61	1.00	1.46	0.04
2013	Habib	0.36	0.70	0.79	4.78	0.05
2014	Habib	0.34	0.74	0.99	4.08	0.04
2015	Habib	0.38	0.70	0.27	3.46	0.02
2016	Habib	0.16	0.66	0.89	1.60	0.04
2009	HabibAG	0.35	0.74	0.89	4.09	0.03
2010	HabibAG	0.31	0.72	1.00	4.19	0.02
2011	HabibAG	0.41	0.70	0.23	4.07	0.04
2012	HabibAG	0.30	0.75	1.00	4.10	0.02
2013	HabibAG	0.54	0.71	0.62	0.32	0.04
2014	HabibAG	0.50	0.73	0.95	0.32	0.03
2015	HabibAG	0.20	0.77	0.98	1.76	0.07
2016	HabibAG	0.32	0.70	0.92	4.37	0.05
2017	HabibAG	0.33	0.72	0.71	5.32	0.04
2018	HabibAG	0.16	0.65	1.00	1.56	0.06
2009	HFC	0.34	0.72	0.78	4.20	0.05
2010	HFC	0.23	0.61	0.86	1.55	0.05
2011	HFC	0.15	0.57	0.76	1.44	0.06
2012	HFC	0.14	0.60	1.00	1.15	0.02
2013	HFC	0.30	0.59	1.00	1.13	0.03
2014	HFC	0.21	0.54	0.56	0.40	0.02
2015	HFC	0.31	0.64	0.81	0.50	0.01
2016	HFC	0.30	0.71	0.62	0.47	-0.01
2017	HFC	0.33	0.58	0.77	1.76	0.02
2018	HFC	0.24	0.57	0.03	1.27	0.03
2009	I&M	0.22	0.15	0.57	0.35	0.06
2010	I&M	0.20	0.57	0.88	0.47	0.06
2011	I&M	0.18	0.67	0.73	0.51	0.05
2012	I&M	0.29	0.73	0.67	14.10	0.04
2013	I&M	0.27	0.75	0.90	14.10	0.04
2014	I&M	0.24	0.41	0.88	0.32	0.04
2015	I&M	0.59	0.64	0.81	0.27	0.05
2016	I&M	0.28	0.09	0.54	0.24	0.04
2017	I&M	0.10	0.49	0.23	0.21	0.05
2018	I&M	0.20	0.34	0.50	0.21	0.05
2009	Imperial	0.45	0.32	0.35	0.27	0.05
2010	Imperial	0.18	0.66	0.45	0.85	0.06
2011	Imperial	0.20	0.70	0.92	0.48	0.05
2012	Imperial	0.36	0.67	0.65	0.39	0.06
2013	Imperial	0.09	0.65	0.54	0.15	0.06
2014	Imperial	0.32	0.70	0.92	4.37	0.05
2010	Jamii	0.37	0.77	0.35	13.98	0.01
2011	Jamii	0.34	0.73	0.85	12.83	-0.05
2012	Jamii	0.34	0.73	0.94	13.54	-0.02
2013	Jamii	0.27	0.74	0.71	14.52	0.02
2014	Jamii	0.36	0.76	0.48	12.49	0.01
2015	Jamii	0.45	0.73	0.62	14.40	0.00
2016	Jamii	0.31	0.73	0.63	14.14	-0.03
2017	Jamii	0.10	0.53	1.00	0.42	-0.06
2018	Jamii	0.08	0.58	0.77	0.47	-0.04
2009	KCB	0.08	0.55	0.36	0.45	0.04
2010	KCB	0.07	0.49	0.53	0.50	0.05
2011	KCB	0.60	0.48	0.42	0.16	0.03
2012	KCB	0.41	0.74	1.00	0.11	0.05
2013	KCB	0.42	0.63	0.41	0.14	0.05
2014	KCB	0.32	0.71	0.73	0.20	0.06
2015	KCB	0.30	0.71	0.76	0.26	0.05
2016	KCB	0.17	0.71	0.46	0.20	0.06
2017	KCB	0.24	0.72	0.81	0.19	0.05
2018	KCB	0.32	0.71	0.80	0.22	0.05
2009	Krep	0.22	0.64	0.69	0.49	-0.04
2010	Krep	0.29	0.71	0.70	0.30	0.04
2011	Krep	0.42	0.66	0.60	5.10	0.04
2012	Krep	0.31	0.51	1.00	0.25	0.01
2013	Krep	0.42	0.63	0.61	0.09	0.02
2014	Krep	0.33	0.68	0.52	0.23	0.03
2015	Krep	0.38	0.68	0.60	5.88	0.05
2017	Mayfair	0.36	0.32	0.61	0.72	-0.08
2018	Mayfair	0.11	0.73	0.76	1.43	-0.04
2009	MEB	0.37	0.69	0.66	0.26	0.01
2010	MEB	0.45	0.32	0.35	0.27	0.05

Years	*Banks*	*HHI_{II}*	*HHI_{NII}*	*TE*	*S*	*RoA*
2011	MEB	0.40	0.65	0.43	0.29	0.02
2012	MEB	0.23	0.73	0.34	0.14	0.01
2013	MEB	0.51	0.61	1.00	2.24	0.01
2014	MEB	0.50	0.64	1.00	2.37	0.01
2015	MEB	0.39	0.63	0.90	2.90	0.03
2016	MEB	0.40	0.61	0.96	3.42	-0.02
2017	MEB	0.42	0.64	0.84	3.60	-0.01
2018	MEB	0.51	0.69	0.65	3.39	0.00
2017	MOrient	0.48	0.67	0.83	0.31	0.01
2018	MOrient	0.33	0.46	0.68	0.30	0.01
2009	NBK	0.48	0.63	0.52	3.00	0.04
2010	NBK	0.50	0.67	0.38	3.59	0.04
2011	NBK	0.49	0.66	0.17	3.72	0.02
2012	NBK	0.48	0.66	0.16	3.96	0.02
2013	NBK	0.28	0.71	0.96	4.50	0.02
2014	NBK	0.28	0.72	0.88	4.24	0.02
2015	NBK	0.31	0.74	0.69	4.50	0.01
2016	NBK	0.28	0.71	0.88	4.17	0.00
2017	NBK	0.24	0.71	0.97	4.32	0.01
2018	NBK	0.47	0.72	0.78	4.41	0.01
2009	NIC	0.21	0.25	0.51	0.30	0.05
2010	NIC	0.35	0.46	0.71	0.28	0.04
2011	NIC	0.41	0.72	0.76	4.62	0.03
2012	NIC	0.19	0.74	0.63	3.27	0.04
2013	NIC	0.22	0.70	0.97	3.70	0.03
2014	NIC	0.17	0.73	0.70	3.39	0.04
2015	NIC	0.28	0.52	0.73	0.29	-0.01
2016	NIC	0.32	0.56	0.73	0.31	0.04
2017	NIC	0.36	0.55	0.43	0.31	0.03
2018	NIC	0.26	0.42	0.48	0.32	0.03
2009	Oriental	0.37	0.50	0.73	0.30	0.04
2010	Oriental	0.33	0.63	0.71	0.31	0.03
2011	Oriental	0.30	0.57	0.54	0.32	0.02
2012	Oriental	0.44	0.66	0.71	0.30	0.03
2013	Oriental	0.47	0.17	0.49	0.28	0.04
2014	Oriental	0.43	0.55	0.59	0.28	0.01
2015	Oriental	0.39	0.65	0.74	0.24	0.00
2016	Oriental	0.26	0.29	0.51	0.30	0.01
2009	Paramnt	0.50	0.76	0.78	0.30	0.01
2010	Paramnt	0.45	0.33	0.66	0.32	0.06
2011	Paramnt	0.37	0.67	0.49	0.25	0.02
2012	Paramnt	0.42	0.75	0.84	1.72	0.01
2013	Paramnt	0.42	0.73	0.73	1.80	0.00
2014	Paramnt	0.47	0.73	0.81	1.71	0.01
2015	Paramnt	0.43	0.73	0.88	1.64	0.02
2016	Paramnt	0.47	0.74	1.00	1.74	0.01
2017	Paramnt	0.41	0.73	0.90	1.82	0.01
2018	Paramnt	0.38	0.61	0.68	0.25	0.01
2009	Prime	0.47	0.69	0.63	1.80	0.02
2010	Prime	0.46	0.74	0.71	1.72	0.02
2011	Prime	0.52	0.67	0.67	2.56	0.02
2012	Prime	0.47	0.74	0.73	2.01	0.03
2013	Prime	0.53	0.15	0.92	1.37	0.04
2014	Prime	0.51	0.41	0.71	0.25	0.02
2015	Prime	0.32	0.65	0.40	0.59	0.02
2016	Prime	0.26	0.74	0.00	0.50	0.04
2017	Prime	0.19	0.62	0.52	0.60	0.04
2018	Prime	0.20	0.60	0.76	0.60	0.03
2017	SBM	0.36	0.69	0.63	0.41	-0.03
2018	SBM	0.13	0.40	0.33	0.35	0.01
2009	SCB	0.43	0.68	0.79	7.19	0.05
2010	SCB	0.38	0.67	0.93	8.29	0.05
2011	SCB	0.36	0.63	0.70	2.38	0.04
2012	SCB	0.35	0.62	0.92	7.74	0.06
2013	SCB	0.53	0.69	0.48	8.19	0.06
2014	SCB	0.55	0.65	0.64	7.11	0.06
2015	SCB	0.41	0.69	0.86	8.09	0.05
2016	SCB	0.50	0.72	0.36	8.02	0.03
2017	SCB	0.27	0.58	0.42	0.25	0.04
2018	SCB	0.48	0.62	0.78	7.00	-0.02
2016	Sidian	0.41	0.54	0.56	5.62	0.00
2017	Sidian	0.55	0.59	0.51	6.60	-0.03
2018	Sidian	0.09	0.65	0.54	0.15	-0.16
2009	S&L	0.35	0.75	0.85	12.69	0.03
2009	Southern	0.20	0.60	0.92	10.06	-0.07
2016	Spire	0.31	0.61	0.68	10.00	-0.14
2017	Spire	0.25	0.40	0.50	1.56	-0.03
2018	Spire	0.33	0.72	0.60	5.31	0.04
2009	TNB	0.30	0.60	0.82	0.34	0.03
2010	TNB	0.37	0.65	0.78	0.39	0.03
2011	TNB	0.34	0.72	0.62	0.42	0.03
2012	TNB	0.49	0.69	0.45	0.44	0.04
2013	TNB	0.43	0.64	0.25	0.37	0.02
2014	TNB	0.40	0.58	0.39	0.37	0.02
2015	TNB	0.28	0.62	0.41	0.28	0.02
2016	TNB	0.25	0.63	0.82	0.33	0.02
2017	TNB	0.47	0.69	0.39	0.37	0.01
2018	TNB	0.27	0.59	0.50	0.30	-0.01
2009	UBA	0.51	0.72	0.58	0.35	-0.17
2010	UBA	0.48	0.66	0.39	0.21	-0.06
2011	UBA	0.57	0.61	0.37	0.20	-0.05
2012	UBA	0.65	0.61	0.82	0.20	-0.14
2013	UBA	0.61	0.70	0.46	0.18	-0.07
2014	UBA	0.64	0.67	0.71	0.17	-0.07
2015	UBA	0.25	0.16	0.10	0.19	0.00
2016	UBA	0.63	0.68	1.00	0.18	-0.04
2017	UBA	0.58	0.64	0.29	0.16	0.01
2018	UBA	0.35	0.24	0.00	0.20	0.00
2009	Victoria	0.35	0.61	0.84	0.59	0.04
2010	Victoria	0.36	0.73	0.79	0.40	0.05
2011	Victoria	0.24	0.66	0.77	0.77	0.03
2012	Victoria	0.26	0.68	0.64	0.71	0.05
2013	Victoria	0.30	0.70	0.68	0.70	0.04
2014	Victoria	0.32	0.72	0.84	0.54	0.04
2015	Victoria	0.44	0.74	0.92	0.51	0.03
2016	Victoria	0.49	0.71	0.87	0.48	0.04
2017	Victoria	0.36	0.67	0.65	0.39	0.03
2018	Victoria	0.34	0.71	0.79	0.42	0.02

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