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Impact of Income and Geographical Diversification on the Financial Performance of Commercial Banks in Kenya

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Declaration

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

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ROE	Return on Equity
ROA	Return on Asset
CBK	Central Bank of Kenya
HHI	Herfindahl Hirschman Index
NII	Net interest income
NONII	Non-interest income

Abstract

So as to better withstand the rapid revolution in the banking sector, characterised by incessant changes in technology, liberalization and stiff competition, commercial banks have resorted to diversifying away from traditional lending activities into new risker areas alongside employing newer distribution channels. The current study analyses the impact of this income and geographical diversification on the financial performance of forty commercial banks in Kenya between 2008 and 2014. Fixed effects and random effects panel analysis frameworks are employed to this end. Performance is measured as Return on Asset (ROA) and Return on Equity (ROE) whereas the degree of diversification is measured using the Herfindahl Hirschman Index (HHI).

The study finds a negative relationship between both income and geographical diversification when ROA is used as a measure of performance, indicating no benefit in diversification. However, using ROE as a measure of performance reveals a positive relationship between both income and geographical diversification and firm performance. The mixed results could be attributed to the fact that net interest income, non-interest income and profit moderately moved together over the period of this study which indicates that they responded to the same economic shocks in a similar manner. In addition, the Kenyan banking industry is dominated by a few large banks with small and medium banks recording dismal ROA despite the increasing diversification efforts. Growth of these bank could significantly improve the results as ROA would improve hence aiding commercial banks to reap the benefits of diversification.

Key words: *Income diversification, Geographical performance, Bank performance, Herfindahl Hirschman Index (HHI)*

1. Introduction

1.1 Background to the study

The traditional role of banks is to intermediate the transaction between borrowers and lenders of money. The income from these financial transactions form bank's traditional income generating activities. However, a critical analysis of the financial statements for commercial banks reveals a different trend, where over 40% of their net operating income comes from non-intermediation income generating activities (Stiroh, 2004). This shows that banks have been diversifying their income sources away from the traditional source.

Diversification refers to the increase by a firm of the number of business lines it runs whether such lines are related or not (Penrose, 1959). Gort (1962) defines diversification in terms of the number of products, services and markets, while, Markowitz (1952) defines diversification in terms of the means and methods that enable organizations to achieve growth and reduce overall risk. Ebrahim and Hasan (2008) defines bank diversification as the expansion into new financial services and other products other than the traditional intermediation activities. Christiansen and Pace (1994) defines bank diversification as the expansion of a banks allowable activities into non-traditional banking activities. There is no consensus on the precise meaning of the concept of diversification among researchers but all definitions seem to converge. When banks diversify, there is combination of different banking activities, income sources, assets and liabilities. Montgomery (1994) identifies three key theoretical motivations behind diversification: the search for market power, the solution to agency problems, and the application of resource bundles to attain a competitive advantage.

Literature on bank diversification suggests the existence of several types of diversification. They include, product or services diversification (Christiansen,1994), geographical diversification, international diversification (Lin, 2010), income diversification (Gambacorta,2014), deposit diversification, asset diversification and diversification into different economic sectors (Berger, 2010). In addition, Hayden and Porath (2007) provide that banks can also diversify their loan portfolios across different types of loans. The common diversification strategies undertaken by Kenyan banks are income diversification, assets diversification, geographical diversification, international diversification and loan diversification.

This research focuses on income and geographical diversification strategies undertaken by Kenyan Commercial Banks. According to Ebrahim and Hasan (2008), income diversification is the expansion into new income earning financial services other than the traditional intermediation services by banks. Geographical diversification on the other hand involves increase of branches and service outlets across a geographical boundary of a country. Obinne (2012) defines geographical diversification as the opening of branches by a bank outside the head office location. It can also be viewed as the spread of banks assets across different geographical points. However, judging from recent years, geographical diversification also captures different ways of geographical diversification other than through increase of bank branches, for instance, mobile banking and agency banking for banks. International diversification is closely related to geographical diversification. It entails a cross-border expansion of banks outlets either through branches or subsidiaries (Berger, 2010). Some researchers incorporate international diversification when studying geographical diversification. For instance, Acharya (2006) where he adopts a geographical diversification measurement expressed by Herfindahl-Hirschman Index (HHI) build on three different territorial macros-areas: Italy, Europe and rest of the world.

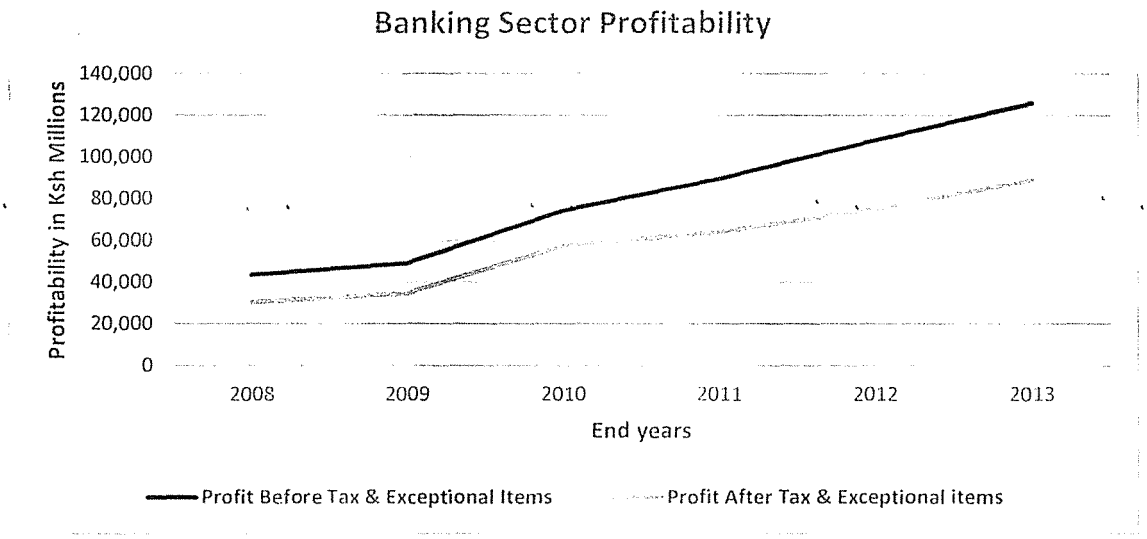
1.2 The banking sector in Kenya

The banking environment in Kenya has undergone many regulatory and financial reforms in the past decade. These reforms have brought about many structural changes in the sector and have also encouraged foreign banks to enter and expand their operations in the country. The number of bank branches has been increasing tremendously over the past few years from 1116 in 2011 to 1423 in 2014 (Appendix 3).

The Kenyan banking industry is one of the broadest and most developed in sub-Saharan Africa. According to the Bank Supervision Annual Report (2013), the banking sector in Kenya is comprised of the Central Bank of Kenya, as the regulatory authority, 44 banking institutions (43 commercial banks and 1 mortgage finance company), 7 representative offices of foreign banks, 9 microfinance banks (MFBs), 2 credit reference bureaus (CRBs), 1 Money Remittance Provider (MRP) and 101 forex bureaus. The 9 MFBs, CRBs and 101 forex bureaus are privately owned. The foreign owned financial institutions comprise of 10 locally incorporated foreign banks and branches of foreign incorporated banks. Out of 44 banking institutions, 30 are locally owned banks - 3 with public shareholding, 27 are privately owned while 14 are foreign owned (Appendix 1). Kenyan banks are further divided into sizes; large banks, medium banks and small banks.

There has been increasing profitability in the Kenyan banking sector as shown by the figure below (Appendix 2).

Fig: 1.2.2 (*Source: Bank Supervision Reports)*



The profitability of Kenyan banks has been on the upward trend as shown by the graph, especially since 2009 onwards. This trend begs the question on what has been causing this upward trend. A gap is created to find out whether income and geographical diversification strategies by banks have been contributing to this profitability. However, this upward trend can partially be attributed to the contribution of agency banking, since it was introduced by the 2009 finance bill.

1.3 Problem statement

Over the last three decades, market deregulation, technological progress, competition and reduced trade barriers across national borders have served as driving forces behind diversification among financial institutions across the world. As a result, the banking industry in Kenya and indeed the rest of the world, is steadily shifting away from traditional sources of revenue such as loans and toward activities that generate fee income, service charges, trading revenue, and other types of noninterest income.

From literature, there is no consensus whether bank diversification improves banks performance or not, which creates need for more research. The profitability of Kenyan banks has been increasing steadily in the past few years, and so have banks been diversifying using different strategies. The geographical strategies undertaken by Kenyan banks contribute greatly

to financial inclusion. This study aims to identify whether geographical diversification impacts on banks' financial performance. On income diversification, lending rates, hence interest income, are highly depended on interest rates guided by the Central Bank which exposes bank earnings to sensitivity on changes in such rates (Kiweu, 2012). This raises the question on whether banks should diversify income sources to ease this pressure on lending rates and stabilize their income or focus on traditional banking activities.

1.4 Research objectives

The research objectives for this study are:

1. To establish the relationship between banks' financial performance and income diversification strategy.
2. To determine the relationship between banks' financial performance and geographical diversification strategy.
3. To find out which diversification, between income and geographical, has a higher impact on financial performance of banks.

1.5 Research hypotheses

The hypothesis of this study is:

H1: There is a positive relationship between bank financial performance and income diversification strategy

H2: There is a positive relationship between bank financial performance and geographical diversification strategy

H3: Geographical diversification strategy has a higher impact on financial performance than income diversification strategy

1.6 Significance of the research

This research will be of importance to bank managers in decision making. It will have important implications for Kenyan Banks which may be trying to follow a diversification model away from traditional banking. In addition, it will act as a guideline on which diversification strategies to peruse between income and geographical strategies judging from their contribution on profitability. The Government will also benefit in terms on knowing which policies to put in place in regard to banking. How banks can improve their profitability is a concern to investors as well.

2. Literature Review

2.1 Income diversification

Banks have two income streams, which are interest based income and non-interest income. Academics have given a lot of attention to lending activity that generates interest income due to the link of this traditional activity to bank performance (Bush, 2009). There is a push in a number of economies for banks to move their business from interest to fee earning activities such as investment banking and insurance (Bush, 2009).USA studies show that in 1990', non-interest income grew rapidly to be a large part of banks operating profits. Non-interest income accounts for 43% of U.S.A commercial banks net operating income (Stiroh, 2004). Researchers argue that for markets with high competition, diversification reduces chances of financial distress and provides a necessary reduction in risk (Gamra, 2011). They further indicate that banks with greater fee-based services charge lower lending rates (Pennaithur, 2012).

Research findings from developed (USA and Europe) markets differ greatly on impact of income source diversification on banks financial statements. It increases risk-return trade-off in European banks while it worsens risk –return trade-off in USA. Diversification benefits from shifting into non-interest income in USA banks (Stiroh K. , 2004) increases bank revenue and reduces volatility of bank profit. However, according to Stiroh and Rumble (2006) diversification worsens the risk-return trade-off for USA banks and earnings gained from diversification caused by growth in non-interest income is outweighed by the volatility increases, resulting in a non-commensurate increase in stock returns. Non-interest income and interest income were increasingly growing highly correlated over time in USA banks (DeYoung, 2001) and exists along with, rather than replace each other. Unlike USA banks, non-interest income and interest income relates negatively (Staikaouras, 2003) and tends to stabilize bank earnings in European banks.

Stiroh (2004) defines noninterest income activity as a measure of the degree of product diversification. According to Stiroh (2004) in his study of the U.S banking industry, he acknowledges that the shift toward noninterest income has contributed to higher levels of bank revenue in recent years, but there is also a sense that it can lower the volatility of bank profit and revenue and reduce risk. He adds that noninterest income may be less dependent on overall business conditions, thus an increased reliance on noninterest income reduces the cyclical variations in bank profits and revenue. Stiroh (2004), in his study, however finds that results from both aggregate and bank data provide little evidence that the shift to noninterest income

offers large diversification benefits in form of more stable profits. On the other hand, Morgan and Stolyk (2003) found that diversification increases the lending capacity of banks and the banking system, but does not increase the profit of individual bank or reduce the risk in their portfolio.

DeYoung (2001) argues that there are three main reasons why non-interest income may increase the volatility of bank earnings: (1) a bank is more likely to lose clients with whom it engages in a fee-based relationship rather than a loan-based relationship. In spite of the greater sensitivity to movements in interest rates and economic downturns, "revenue from a bank's traditional lending activities is likely to be relatively stable over time, because switching costs and information costs make it costly for either borrowers or lenders to walk away from a lending relationship" (2) Moving from interest to non-interest income can require heavy fixed investments in technology and human resources. As a consequence, an increase in operating leverage and earnings volatility (3) Many fee-based activities can be performed holding little or no regulatory capital and this suggests a higher degree of financial leverage and, as a consequence, earnings volatility.

In Kenya and generally in the banking industry, the costs of bank supervision are tied to the perceived riskiness of the institution; this gives banks an additional incentive to reduce risk. Moreover, several models of intermediation theory suggest that diversification makes it cheaper for institutions to achieve credibility in their role as screeners or monitors of borrowers (Diamond, 1984). A bank only benefits from noninterest income if the noninterest income is negatively or weakly correlated to net interest income (Stiroh, 2004).

Using annual data from Italian banks, Vincenzo (2008) found a link between non-interest revenues and profitability. He found that income diversification increases risk-adjusted returns. Their results provide econometric evidence consistent with current studies on European banks, but do not support findings on the U.S. The question now arises as to whether the Italian results are valid for Kenyan banks.

2.2 Geographical diversification

The banking literature tends to presume that diversification and size go hand in hand. This research aims to demonstrate empirically whether this presumption is valid. Rebecca (1997) found that large bank holding companies (BHCs) are better diversified that small BHCs based on market measures of diversification- a strong positive effect of size on BHCs. Diversification was measured using a sample of bank holding companies using stock market data.

Shiers (2002) in his analysis of geographical diversification of a sample of American banks, pointed out that the effectiveness of a diversification of the market being served is subordinate to the presence of significant economic differences between the areas where the bank branches are located. He found that, if the geographical areas have marginal economic differences, more extreme geographic diversity mixes do not produce positive effects on risk and on the stabilization of the bank performance. A bank that diversifies into new markets can incur greater risks resulting from the capture of customers of worse quality as a result of an inefficient selection corollary to poor knowledge of the new market; asymmetry in information. In addition, Deng and Elyasiani (2008) found that geographic diversification is associated with bank holding company value enhancement and risk reduction, increased distance between a bank holding company and its branches is associated with firm value reduction and risk increase.

Demsetz and Strahan (1997) found that the larger bank holding companies were better diversified across regions and loan types, and such diversification reduced the volatility of banks' stock return. Acharya, Hasan, and Saunders (2006) using banks' credit portfolios, studied how diversification affects profitability of Italian banks between 1993 and 1999. They found that diversification across industrial loan groups is associated with lower bank returns. They also reported that their broad measure of geographic diversification improved the risk return trade-off for banks with low levels of risk, measured using data on doubtful and nonperforming asset or stock reruns where available. However, Hayden (2007) investigated German banks and found that diversification tends to be associated with reductions in bank returns, even after controlling for risk. Donal and Katherine (2003) on the other hand, found that diversification is associated with higher loan-to-asset ratios across banks of all sizes, but the high loan ratios did not translate into improved asset quality, or improvements in ROA or ROE.

Hirtle (2007) using a sample of about 5000 observations relative to US banks over the time period 1995-2003 found no systematic correlation between branch network size and overall bank performance. Hirtle (2007) shows how the increase in size of the branch network causes a downturn in bank performance. As a result, geographical diversification within the same country presupposes an increase in the functional distance of the bank, meant as the distance between the central management and the branch, and can produce repercussions on both the level of profitability and the extent of the exposure to intermediary risk (Alessandrini P., 2010).

The main results of geographical diversification of a bank include an increase in functional distance; distance between bank's headquarter and its own branch.

Hirtle (2007) on a sample of about 5000 observations relative to US banks over the time period 1995-2003 found no systematic correlation between branch network size and overall bank performance. However, Cotugno and Stefanelli (2012), confirmed a positive relationship between geographical diversification and bank performance; and identical results are obtained with respect to the product diversification.

2.3 Discussion of previous work

Deregulation and new technology have eroded banks' comparative advantages and made it easier for non-bank competitors to enter these markets, necessitating banks to shift their sales mix and diversify towards non-interest income sources (Montiel, 1995). There are several motives for diversification as found by various researchers: income diversification reinforces the role of banks as delegated monitors thereby increasing the volume of intermediation. This is because banks can limit information asymmetry by using vital information from their lending relationship to boost provision of other financial services (Baele, 2007). Froot and Stein (1998) deduced that diversification is a hedge against insolvency risk that reduces the occurrence of costly financial distress. Landskroner (2005) on the other hand argued that diversification is a mechanism to boost profitability and operational efficiency particularly if the scale and scope of operation increases. Lastly, non-interest income lowers the cyclical variations in profits if returns across bank activities are not perfectly correlated, in addition, diversification creates competitive pressure among banks across a wider range of market segments, which increases innovation and efficiency in the provision of services (Landskroner (2005); Acharya (2006); Lepetit (2008)).

There are arguments in literature as to why the potential and actual benefits of diversification may be different: The subsequent inability to effectively monitor loans may increase asymmetric information between bank and its pool of borrowers (Carlson (2004), Stiroh (2006)). Diversifying beyond risk optimal levels, which causes idiosyncratic risk to increase, may distort the true relationship between diversification and risk. Hence, diversification may actually worsen risk-adjusted performance, particularly when banks over expand into industries where they face higher competition or lack expertise.

While diversification decreases vulnerability to idiosyncratic shocks, there is a corresponding rise in exposure to systemic shocks because of the number of markets banks become active in

(Vries, 2005). Wheelock (1995) shows that during the Great Depression, states in the US that had more branch banks had lower failure rates. The unit bank system of Bulgaria was relatively more stable during the same period. However, Grossman (1994) cautions against the optimism of this view, since banks in Belgium and France, which were geographically diversified, also suffered crises.

Froot and Stein (1998) fond that banks that engage in active credit risk management hold riskier loans, while Strahan (2004) suggest that diversified banks take on more risk and operate with greater financial leverage. Therefore, the gains from diversification depend on the actual portfolio held by the bank and benefits will be limited if they do not hold a risk efficient portfolio. The debate on whether size and benefit from diversification is yet to be concluded among researchers. For instance, Goddard (2008) found that diversification only benefits large credit unions in the US. Other studies such as Lepetit (2008) and Mercieca (2007) found limited diversification benefits for small banks in Europe. Studies that have a high proportion of small banks in their sample such as Acharya (2006) find similar results. Hence, the indiscriminate adoption of the universal banking principle across banks of all asset sizes severely limits diversification benefits.

2.4 Research gap

Most studies addressing the relationship between bank performance and diversification have mainly been carried out in the developed countries. The income and geographical diversification effect on financial performance of such institutions are different from that of banks in developing countries such as Kenya. Moreover, there seems to be no consensus whether diversification by banks leads to better bank financial performance or not. This therefore creates need for further research.

Athansasogou (2006) argued that the importance of banks is more pronounced in developing countries because financial markets are usually underdeveloped, and banks are typically the only major source of finance for the majority of firms and are usually the main depository and economic savings. With the increasing importance of banks in developing countries, and the limited research done on developing countries, this research aims to contribute to the discussion by examining the relationship between income and geographical diversification strategies and their impact on financial performance of commercial banks in Kenya. Moreover, to the best of my knowledge, no research has been done in Kenya to compare which diversification strategy, between income and geographical has a greater impact on financial performance of banks.

3. Methodology

3.1 Population sampling

The study used panel data, with data from the year 2008 to 2014. This time period captured the period when bank profitability started increasing, in addition, it accounted for when agency banking started (2009). Forty banks, which have been in operation since 2008, were examined. This will make it easier to compare performance of the different bank size categories; large, medium and small.

3.2 Data collection

Secondary data was used to get relevant information for the study. Data on income diversification was collected from individual bank financial statements. Annual bank supervision reports published by the Central Bank of Kenya were used to get data on geographical distribution of bank branches in the country.

3.3 Econometric model

The econometric analysis used panel data. The Hausman test was performed with a so as to choose which model, between fixed effect and random effect, to use. The analysis considered three different categories of variables: a) financial performance measures (dependent variables); b) diversification measures (independent variables); and c) control variables. In addition, a dummy variable to account for agency banking was be used.

$$Y_i = \beta_0 + \beta_1 HHI_{GEO_{it}} + \beta_2 HHI_{INC_{it}} + \beta_3 BS_{it} + \beta_4 EA_{it} + \beta_5 D_i + \varepsilon_{it} \quad (1)$$

$$D_i = \begin{cases} 1 \; if \; bank \; i \; has \; agency \; banking \\ or \\ 0 \; otherwise \end{cases}$$

Where i identifies the individual bank belonging to the sample, Y_i is the dependent variable (Return on equity (ROE) and Return on asset (ROA)), t expresses time variable, $\beta_1, \beta_2, \ldots, \beta_4$ are the parameters to be estimated. Different tests were carried out on the regression.

3.4 Data analysis

3.4.1 Financial performance measures

Return on Asset (ROA) and Return on Equity (ROE) were used as a measure of financial performance. The same variables were used by Acharya (2006) as return measures where he found a positive relationship between geographical concentration and economic performance

expressed in terms of ROE, ROA and stock return. The same variables have also been used in similar studies: Shiers (2002) in a study of geographical diversification of a sample of American banks in different states, found that there was no benefits for banks, in terms of ROE or ROA, during the period 1966-1996.

In addition, the Central Bank of Kenya uses the Capital Adequacy, Asset quality, Management quality, Earnings & profitability and Liquidity (CAMEL) rating system to assess the soundness of commercial banks (Central Bank of Kenya, 2013). On the Earnings & Profitability category, which is in the interest of this study, the measures are; ROA, ROE, interest margin to Gross Income, Non-interest expenses to Gross income.

Adopting the same method as Acharya (2006) to calculate ROA and ROE:

ROA = Return on Assets, measured as the ratio of Net income to Total Assets

ROE = Return on Equity, measured as ratio of Net income to Equity

3.4.2 Diversification measures

The degree of income and geographical diversification was measured using the Herfindahl-Hirschman Index (HHI). HHI is the sum of squares of exposures as a fraction of total exposures (Acharya, 2006). The sum is squared in order to give due weight on the size of a bank (Stiroh, 2004). A Herfindahl Index close to its minimum means that banks are highly diversified across sectors (Schertler, 2006). The minimum being zero and maximum one.

The Herfindahl-Hirschman Index (HHI) is:

$$HHI = \sum_{i=1}^{n} \left(\frac{x_i}{Q}\right)^2 \qquad (2)$$

Where, $Q = \sum_{i=x}^{n} x_i, x_2, \ldots, x_n$ i.e. total exposure

HHI = level of diversification, and x_i= an exposure variable.

However, this research adopted an Adjusted HHI approach similar to Acharya (2006), Stiroh and Rumble (2006) and Stiroh (2004), in measurements of both income and geographical diversification. The exposures in this study are the different components found in income and geographical diversification strategies.

3.4.2.1 Income diversification

To measure revenue diversification, Herfindahl Hirschman Index (HHI) was computed for all banks. This accounted for diversification between the two major types of income generating activities. The measure also revealed how Kenyan commercial banks are diversified in income sources, by analysing the HHI for banks under study.

Following Stiroh and Rumble (2006), the measure of income diversification is defined as:

$$HHI_{INC_i} = 1 - \{(\frac{NII}{NOI})^2 + \left(\frac{NNOII}{NOI}\right)^2\} \quad (3)$$

Where HHI_{INC_i} = level of income diversification, NII = Net interest Income, NONII = Non Interest income, NOI = Net Operating Income. The sum of squared revenue is subtracted from 1 so that HHI level increases with level of diversification, which takes on values between 0 and 1.As HHI rises, the bank becomes more concentrated and focused on one source of income and less diversified. Hence, well diversified banks are reflected by a small HHI, that is, the smaller the index, the more diversified the bank. The HHI_{INC_i} measures shifts into non-interest income generating activities.

3.4.2.1.1 Diversification in Revenue Components and Profit

Both interest and non-interest income are heterogeneous and diagnosing each component reveal different levels of diversification. To observe the trend, the components of revenue diversification (HHI_{NONII_i} and HHI_{NII_i}) and profit were observed for the time period under study. This trend observation was useful in explaining the relationship of the income sources and profit; whether they move together. The same method of observation was used by Rotich and Okaka (2011) in their analysis of Income source diversification and financial performance of Kenyan banks.

Banks' Income statement contains net interest income (NII) and non-interest income (NONII) as major revenue streams. Interest income components are; loans and advances, government securities, deposits and placement with other banking institutions, and other non-interest income. The non-interest income components are; fees and commissions on loans and advances, other fees and commissions, foreign exchange trading income, dividend income, and other non-interest income.

$$HHI_{NONII_i} = 1 - \left\{\left(\frac{FL}{NONII}\right)^2 + \left(\frac{OF}{NONII}\right)^2 + \left(\frac{FOREX}{NONII}\right)^2 + \left(\frac{DIV}{NONII}\right)^2 + \left(\frac{ONONII}{NONII}\right)^2\right\} \quad (4)$$

$$HHI_{NII_i} = 1 - \left\{\left(\frac{L}{NII}\right)^2 + \left(\frac{GOVT}{NII}\right)^2 + \left(\frac{DP}{NII}\right)^2 + \left(\frac{DIV}{NII}\right)^2 + \left(\frac{ONNIO}{NII}\right)^2\right\} \quad (5)$$

Where: HHI_{NONII_i} = Non Interest Income diversification, HHI_{NII_i}=Net Interest Income diversification, FL = fees and commission on loans and advances, NONII = Non Interest Income, OF = other fees and commission, FOREX = foreign exchange trading income, DIV = dividend income, ONONII = other non-interest income, NII = Net Interest income, L = Loans and advances, GOVT = government securities, DP = deposit and placement, ONII = other interest income.

3.4.2.2 Geographical diversification

The measures of geographical and income diversification of a bank were based on the Herfindahl-Hirschman Index (HHI). It takes into account the distribution of the branches of an individual bank over the Kenyan territory. It measures the level of geographical concentration and, indirectly, the level of diversification. The Hirschman Herfindahl Index is the sum of the squares of exposures as a fraction of total exposure under a given classification, a higher value of the index corresponds to greater focus or lower diversification (Viral Acharya, 2006). Acharya (2006) adopted a geographical diversification measurement expressed by HHI build on three different territorial macros-areas: Italy, Europe and rest of the world. Kenyan banks derive most of their income from Kenya, in addition, not all banks have diversified outside Kenyan territory. For this reason, this research proposes a national geographical diversification measurement based on HHI, calculated in respect of individual bank branches in the country. Cotugno (2012) applied the following measure of geographical diversification:

$$HHI_{GEO_i} = \sum_{j=1}^{k} \left(\frac{Bank\ Branches\ in\ province_{ij}}{Total\ Bank\ Branches_i}\right)^2 \quad (6)$$

Where i represents the i^{th} bank, j represents the province where it is located (j= 1, 2, 3... k where k equals 108 provinces in 2010). Province was replace with county to fit it into the Kenyan context. The values of this indicator range from 0 to 1, where the value 1 highlights the maximum geographical concentration, while the indicator values close to zero represents the maximum possible geographical diversification for a bank, with branches equally distributed throughout the national territory.

However, Agency banking and mobile banking also play a big role in geographical diversification in Kenya. Banks can take advantage of the mobile phone technology in two

ways: create their own mobile banking platform, Equity Banks' Equitel for instance, or partner with mobile platform providers, as many banks have done. Banks can leverage on distribution networks such as supermarkets, pharmacists etc. by use of agents. Agency banking has thus greatly contributed to the geographical diversification, in addition to mobile platform. For this reason, this study accounted for this using a dummy variable accounting from the period agency banking was introduced in Kenya; according to the Bank Supervision Report (2009), the Finance Bill 2009 introduced agent banking in 2009. Since not all banks have agency banking, the dummy variable will specify those with and those without as follows:

$$D_i = \begin{cases} 1 \; if \; bank \; i \; has \; more \; than \; x \; agents \\ or \\ 0 \; otherwise \end{cases} \quad (8)$$

The more the agents, the bigger the impact on geographical diversification. To the best of my knowledge, this additional factor (use of a dummy variable) has not been used in similar studies, nevertheless, it is useful in studying geographical diversification of Kenyan banks.

3.4.3 Control variables

Control variables commonly used in diversification studies include: total asset, equity multiplier (EM), return on equity (ROE), return on asset (ROA), loan/asset ratio, GDP growth, inflation and interest rate.

The control variables control for all characteristics which differ between banking groups, such as regional constraints and different ownership structures. Prior research such as Acharya (2006), Stiroh and Rumble (2006) and Baele (2007) identified the need to control for the endogeneity of the diversification decision because banks may diversify in strategic response to their business opportunities.

Bank Size (BS) = Natural Logarithm of Total Assets

This controls for the fact that larger banks may be inherently more stable, since idiosyncratic risk tends to decline with size (Baele, 2007). Large banks may also have better diversification opportunities and thus less income volatility from branching into new markets. Moreover, bank size accounts for economies and diseconomies of scale. The natural logarithm of bank's total assets is used as a control for bank size since large banks may have better diversification

opportunity (Baele, 2007). Size is measured by the natural log of level of assets of the bank. Hayden (2007) measures bank size as Bank Size (BS) = Natural Logarithm of Total Assets.

Equity/Asset (EA) = the ratio of book value of Equity to Total assets

This controls for the relationship between bank fragility and level of capitalization. According to Lehar (2005), capital absorbs large shocks and protects banks when asset values decline reducing profitability of failure. The same control variable was used by Sarah and Wolfe (2011).

4. Results and analysis

4.1 Regression results

According to the hausman test, fixed model was appropriate for ROA while random model was appropriate for ROE. However, HHI geographical being a time constant variable, random effect model was solely used for it. The results of ROA and ROE regression however seem to differ. HHI income showed a negative significant relationship with ROA (Table 4.1.1), even after controlling for bank size and equity/asset ratio. This finding is similar to that of Stiroh and Rumble (2006) and Stolyk (2003) who found no benefit in diversification. Bank size was significant in explaining the regression but became insignificant after equity/asset ratio was added to the regression. Equity/asset was significant in explaining the regression in model 3 and model 4. Model 3 was the most parsimonious.

Table 4.1.1: Regression of ROA with fixed effect model

	Model 1	Model 2	Model 3	Model 4
HHI income	-0.2972**	-0.3206**	-0.2933**	-0.2756**
	(0.000)	(0.000)	(0.000)	(0.000)
Bank size		-0.0235**	-0.0071**	
		(0.007)	(0.412)	
E/A			0.2752**	0.2881**
			(0.000)	(0.000)
R squared	0.0645	0.0924	0.2045	0.2022
P value	0.0001	0.000	0.000	0.000
F value	16.48	12.11	20.31	30.16

*Regression was estimated using fixed effect model with ROA as the dependent variable. Value in brackets is the P value. ** indicate statistical significance at 95% confidence interval. Source: Data analysis*

HHI geographical also shows a similar trend as HHI income when regressed using ROA (Table 4.1.2). It has a negative non-significant relationship with ROA apart from in model 4 and model 3 where it shows a positive non-significant relationship with ROA. The negative relationship resonates with the findings of Shiers (2002) and Hirtle (2007) who found no benefit for banks to diversify geographically. HHI income still shows a negative significant relationship with ROA in model 2 and 6. Bank size and equity/asset ratio were significant in explaining the

regression unlike the dummy variable for agency banking, which was not. Model 5 was the most parsimonious model.

Table 4.1.2: Regression of ROA with random effect model

	Model 1	Model 2	Model 3	Model 4	Model 5
HHI geo	-0.0017	-0.0064	0.0086	0.0084	-0.0154
	(0.113)	(0.786)	(0.708)	(0.723)	(0.525)
HHI income	-0.1854**				-0.2053**
	(0.000)				(0.000)
Bank size		0.006085	0.0115**	0.0115**	0.0106**
		(0.102)	(0.002)	(0.004)	(0.007)
E/A			0.2644**	0.2651**	0.2781**
			(0.000)	(0.000)	(0.000)
Agency (dummy)				-0.0007	0.0049
				(0.96)	(0.736)
Wald	13.14	3.25	43.27	43.06	63.51
P value	0.0014	0.1969	0.000	0.000	0.000

*Regression was estimated using random effect model with ROA as the dependent variable. HHI geographical was a time constant variable. Value in brackets is the P value. ** indicate statistical significance at 95% confidence interval.*

Source: Data analysis

With regressing with ROE as the dependent variable (Table 4.1.3), HHI income shows a non-significant positive relationship with ROE which is closely consistent with the result of Vincenzo (2008) who found diversification increases risk adjusted returns. Moreover, HHI geographical also shows a non-significant positive relationship with ROE in models 4 and 5. This is the opposite when ROA is used as the dependent. Bank size was a significant variable in explaining the regression unlike equity/asset and the dummy variable which were not significant. Model 5 was the most parsimonious model. This regression implies that there is benefit for banks to diversify both by income and geographical.

Table 4.1.3: Regression of ROE with random

	Model 1	Model 2	Model 3	Model 4	Model 5
HHI income	0.1404	0.1345	0.1450		0.1860
	(0.387)	(0.417)	(0.351)		(0.242)
HHI		-0.0248		0.0863	0.1095
geographical		(0.822)		(0.360)	(0.251)
Bank size			0.0621**	0.0635**	0.0655**
			(0.000)	(0.000)	(0.000)
E/A			-0.0446	-0.0290	-0.0339
			(0.826)	(0.824)	(0.795)
Agency			-0.8975**	0.0293	0.0226
(dummy)			(0.000)	(0.611)	(0.693)
Wald	0.7	0.80	26.66	25.98	27.73
P value	0.3871	0.6689	0.000	0.000	0.000

*Regression was estimated using random effect model with ROE as the dependent variable. Value in brackets is the P value. ** indicate statistical significance at 95% confidence interval. Source: Data analysis*

Further measurements of ROE using fixed effect model shows that HHI income has a positive significance relationship with ROE (Table 4.1.4).

Table 4.1.4: Regression of ROE with fixed model

	Model 1	Model 2	Model 3
HHI income	0.1974	0.3864**	0.3800**
	(0.280)	(0.044)	(0.048)
Bank size		0.0730**	0.0691**
		(0.003)	(0.009)
E/A			-0.0647
			(0.654)
R squared	0.0049	0.0400	0.0408

P value	0.2801	0.0078	0.0195
F value	1.17	4.96	3.36

*Regression was estimated using fixed effect model with ROE as the dependent variable. Value in brackets is the P value. ** indicate statistical significance at 95% confidence interval. Source: Data analysis*

4.2 General level of diversification

Most banks are fairly diversified geographically, with the banking sector having an average HHI of 0.36 under the period under study. Most of the tier 1 banks are well diversified, with KCB being the most diversified bank geographically from all the banks, with HHI of 0.08. From tier 2 banks, NBK is the most diversified with HHI of 0.14; from tier 3 the most diversified geographically is Family Bank with HHI of 0.14; and from tier 4 Credit Bank and Trans National Banks are the most diversified at HHI of 0.18. Generally, diversification diminishes with bank size, and this matches the recent findings of Chiarozza (2008). This reason can be argued from the point of view that bigger banks enjoy economies of scale and have the financial capacity to diversify geographically more than the smaller banks. These findings are also consistent with that of Rebecca (1997) who found that large banks are better diversified that small banks.

Overall, the least diversified banks are from tier 4 banks; Victoria Bank and Development Bank both with HHI of 1. Both have bank branches located only in one county in Kenya, Nairobi County. Nairobi County also has the highest number of bank branches, 543, followed by Mombasa County with 110 branches. Counties with the least number of bank branches include; Samburu County 2, Tana River County 3, West Pokot County 3, Baringo County 8, Wajir County 5, Vihiga County 5 and Turkana County 4. Appendix 4 shows the diversification of all banks according to tier bank. Counties vary in economic activities and this helps to explain the difference in the number of banks per county.

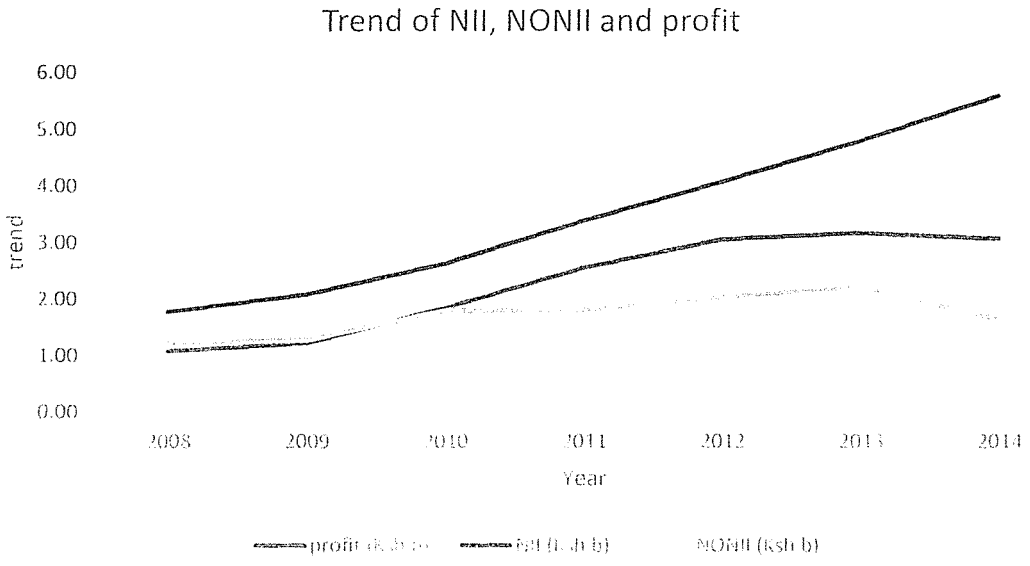
All banks are diversified in their income source with the industry average being 0.40 between the periods under study (Appendix 8). The most diversified bank is KCB with HHI of 0.16. The least diversified banks are; Dubai Bank HHI 0.49, Citi Bank HHI 0.49, Fidelity Bank HHI 0.48 and CBA HHI 0.48. Tier wise, Tier 3 banks are most diversified with average HHI of 0.38, followed closely by tier 1 banks with HHI 0.39, then tier 4 banks with HHI 0.40, and finally tier 2 banks with HHI 0.43.

4.3 Trend of NII, NOII and profit

Net interest income, non-interest income and profit have all been moving together over time with net interest income being most stable over time. Profit and NONII were moving closely together between periods 2008 to 2010 and thereafter, profit started moving at a faster rate than NONII as much as they were still moving together. NII generally moves at a faster rate than NONII, but they still move together over time. From the graph, NII and NONII are moderately correlated over time and this implies that the two revenue could be responding to the same economic shocks.

This result closely match earlier researcher's finding such as Stiroh (2004) where he found that the two streams of revenue are highly correlated. This also implies that there could be little or no diversification benefits as the banking industry steadily shifts it revenue focus to non-interest income. On the contrary, De Yong and Ronald (2001) found that non-interest and interest income exists along rather than replacing each other. Nevertheless, the findings suggest that banks focussing on their traditional income source are more profitable. Moreover, non-interest income is more volatile and tends to introduce offsetting effects on profit, which is similar findings as Stiroh (2004). This suggests that the benefits of diversification are unlikely.

Fig: 1.2.5 *Source: Data analysis, table 1.2.5 (Appendix 5)*



5. Conclusion and recommendation

Based on a combination of fixed and random effect models, there is evidence that income diversification has a negative significant impact on bank performance, measured using ROA. However, when measured using ROE, it shows a positive impact on bank performance. As for geographical diversification, it reveals a positive impact on bank performance when measured using ROE, but shows a negative impact on performance when measured using ROA.

The results of ROA implies that income and geographical diversification have negative impact on bank performance. This indicates that there is no benefit, in terms of financial performance, from diversification that banks have been adopting. However, regression with ROE reveal a positive impact of diversification of bank performance, for both income and geographical. The negative impact revealed with ROA regression indicate that the Kenyan banking industry is not yet efficient in management and using its assets to generate earnings, as it diversifies.

The mixed results could be attributed to the fact that net interest income, non-interest income and profit moderately moved together over the period of this study which indicates that they responded to the same economic shocks in a similar manner. In addition, the Kenyan banking industry is dominated by a few large banks with small and medium banks recording dismal ROA despite the increasing diversification efforts. Growth of these bank could significantly improve the results as ROA would improve hence aiding commercial banks to reap the benefits of diversification.

All banks, save from Victoria Bank and Development bank, have diversified geographically to some extent, with large banks being more diversified. However, most banks are located in more economic active counties which can be attributed to the different levels of economic activities. In addition, all banks have diversified in their income sources which indicates that Kenyan banks have moved away from traditional banking activities by diversifying. Individually, some banks benefit from diversification, but industry wise, most banks still need to achieve a certain level of efficiency in their diversification before seeing concrete benefit. This findings advance the current debate in literature which still leaves room for further research.

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Appendices

Appendix 1: Ownership and asset base of commercial banks

Table 1.2.1: Ownership and Asset Base of Commercial Banks (KSH. M)				
Ownership	Number	% of Total	Total Net Asset	% of Total
Local Public Commercial Banks	3	7.0%	124,853	4.6%
Local Private Commercial Banks	26	60.4%	1,659,017	61.4%
Foreign Commercial Banks	14	32.6%	919,524	34.0%
	43	100.0%	2,703,394	100.0%
Source CBK (Dated - 2013)		**Charter House Bank Excluded*		

Appendix 2: Banking sector profitability since 2008

Table 1.2.2: Banking Sector Profitability Since 2008						
End Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Profitability in KSH Millions						
Profit/Loss Before Tax and Exceptional Items - A	43,293	48,926	74,272	89,453	107,898	125,760
Profit /Loss After Exceptional Items - B	43,327	49,006	77,024	89,446	107,890	124,932
Profit/Loss After tax and Exceptional Items - C	30,149	34,523	57,590	63,955	75,039	88,830
Annual Growth Rate (%)						
Growth rate A	21.6	13.0	51.8	20.4	20.6	16.6
Growth rate B	21.1	13.1	57.2	16.1	20.6	15.8
Growth rate C	20.8	14.5	66.8	11.1	17.3	18.4
Source: CBK Bank Supervision Annual Report						

Appendix 3: Number of bank branches per county

Table 1.2.3 Number of bank branches per country

County	2011	2012	2013	2014
Baringo	8	8	8	8
Bomet	7	7	8	9
Bungoma	15	17	18	20
Busia	8	9	11	12
Elgeryo/Marakwet	1	1	3	4
Embu	9	9	10	11
Garissa	7	7	7	7
Homa Bay	9	9	11	11
Isiolo	6	6	6	6
Kajiado	28	31	38	42
Kakamega	16	16	17	17
Kericho	12	13	14	16
Kiambu	50	59	0	75
Kilifi	24	28	31	35
Kirinyaga	12	14	14	15
Kisii	20	22	24	24
Kisumu	36	38	40	41
Kitui	13	14	14	14
Kwale	10	11	12	13
Laikipia	11	13	13	14
Lamu	4	6	8	8
Machakos	17	18	18	22
Makueni	9	10	11	12
Mandera	2	2	2	2
Marsabit	5	5	5	6
Meru	37	38	40	40
Migori	9	10	10	11
Mombasa	98	108	118	127
Murang'a	20	20	21	21
Nairobi	465	518	530	570

County	2011	2012	2013	2014
Nakuru	52	57	58	60
Nandi	10	11	11	12
Narok	8	10	10	12
Nyamira	4	4	4	5
Nyandarua	7	8	8	10
Nyeri	25	26	26	8
Samburu	2	2	2	2
Siaya	5	6	6	6
Taita/Taveta	9	9	10	10
Tana River	3	3	3	3
Tharaka Nithi	3	3	3	3
Trans Nzoia	1	12	12	16
Turkana	3	3	3	5
Uasin Gishu	3	38	39	43
vihiga	6	6	6	6
Wajir	5	5	6	6
West Pokot	2	2	3	3
Total	1116	1272	1272	1423

Source CBK Bank Supervision Reports

Appendix 4: HHI geographical and HHI income per tier bank

Table: 1.2.4

Bank	Tier	HHI Geo	HHI Inc.
BARCLAYS	1	0.25	0.46
CO-OPERATIVE	1	0.14	0.46
EQUITY	1	0.13	0.44
KCB	1	0.08	0.16
SCB	1	0.26	0.45
Average		**0.17**	**0.39**
CFC STANBIC	2	0.36	0.31
CITIBANK	2	0.38	0.49
CBA	2	0.39	0.48
DTB	2	0.30	0.38
I&M	2	0.39	0.42
NBK	2	0.14	0.46
NIC	2	0.48	0.44
Average		**0.35**	**0.43**
ABC	3	0.22	0.40
BOA	3	0.22	0.46
BARODA	3	0.18	0.22
INDIA	3	0.63	0.27
CHASE	3	0.41	0.42
CONSOLIDATED	3	0.23	0.47
ECOBANK	3	0.29	0.43
FAMILY	3	0.14	0.29
GTB	3	0.32	0.43
IMPERIAL	3	0.39	0.37
PRIME	3	0.54	0.43
Average		**0.32**	**0.38**
CREDIT	4	0.18	0.40
DEVELOPMENT	4	1.00	0.35
DUBAI	4	0.33	0.49
EQUITORIAL	4	0.37	0.42
FIDELITY	4	0.44	0.48
FIRST COMM.	4	0.25	0.40
GIRO	4	0.55	0.37
GUARDIAN	4	0.38	0.36
GULF	4	0.52	0.37
HABIB	4	0.28	0.34
HABIB2	4	0.63	0.27
K-REP	4	0.09	0.40
MIDDLE EAST	4	0.68	0.46
ORIENTAL	4	0.30	0.47
PARAMOUNT	4	0.50	0.38

TRANS-NATIONAL	4	0.18	0.43
VICTORIA	4	1.00	0.34
Average		**0.45**	**0.40**

Source: CBK and research data

Appendix 5: Trend in average HHI income, profit, NNI and NONII

Table: 1.2.5

Average Trends							
year	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*
HHI income	*0.43*	*0.43*	*0.46*	*0.35*	*0.41*	*0.37*	*0.34*
profit (KES b)	*1.07*	*1.21*	*1.83*	*2.55*	*3.05*	*3.17*	*3.07*
NII (KES b)	*1.76*	*2.08*	*2.62*	*3.38*	*4.07*	*4.79*	*5.58*
NONII (KES b)	*1.21*	*1.28*	*1.78*	*1.80*	*2.02*	*2.21*	*1.63*

Appendix 6: HHI income trend for all banks

Table: 1.2.8

HHI income								
Bank	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*Average HHI*
ABC	*0.46*	*0.44*	*0.46*	*0.12*	*0.46*	*0.42*	*0.40*	*0.40*
BOA	*0.50*	*0.50*	*0.48*	*0.40*	*0.43*	*0.44*	*0.45*	*0.46*
BARODA	*0.21*	*0.23*	*0.46*	*0.13*	*0.23*	*0.15*	*0.13*	*0.22*
INDIA	*0.31*	*0.30*	*0.29*	*0.25*	*0.31*	*0.21*	*0.22*	*0.27*
BARCLAYS	*0.48*	*0.47*	*0.48*	*0.47*	*0.45*	*0.44*	*0.43*	*0.46*
CFC STANBIC	*0.46*	*0.48*	*0.50*	*-0.74*	*0.50*	*0.50*	*0.50*	*0.31*
CHASE	*0.43*	*0.46*	*0.47*	*0.42*	*0.43*	*0.34*	*0.39*	*0.42*
CITIBANK	*0.50*	*0.49*	*0.50*	*0.50*	*0.49*	*0.49*	*0.47*	*0.49*
CBA	*0.49*	*0.48*	*0.49*	*0.48*	*0.48*	*0.48*	*0.49*	*0.48*
CONSOLIDATED	*0.50*	*0.49*	*0.50*	*0.49*	*0.47*	*0.41*	*0.45*	*0.47*
CO-OPERATIVE	*0.48*	*0.49*	*0.48*	*0.45*	*0.44*	*0.44*	*0.44*	*0.46*
CREDIT	*0.43*	*0.37*	*0.50*	*0.45*	*0.37*	*0.32*	*0.32*	*0.40*
DEVELOPMENT	*0.40*	*0.39*	*0.36*	*0.37*	*0.44*	*0.26*	*0.25*	*0.35*
DTB	*0.44*	*0.41*	*0.47*	*0.39*	*0.34*	*0.32*	*0.31*	*0.38*
DUBAI	*0.45*	*0.50*	*0.50*	*0.50*	*0.50*	*0.49*	*0.47*	*0.49*
ECOBANK	*0.49*	*0.47*	*0.50*	*0.46*	*0.10*	*0.49*	*0.50*	*0.43*
EQUITORIAL	*0.35*	*0.31*	*0.50*	*0.50*	*0.46*	*0.36*	*0.45*	*0.42*
EQUITY	*0.50*	*0.49*	*0.50*	*0.28*	*0.42*	*0.46*	*0.45*	*0.44*
FAMILY	*0.50*	*0.50*	*0.50*	*-0.76*	*0.42*	*0.41*	*0.44*	*0.29*
FIDELITY	*0.50*	*0.50*	*0.46*	*0.48*	*0.49*	*0.48*	*0.47*	*0.48*
GTB	*0.38*	*0.43*	*0.48*	*0.48*	*0.48*	*0.39*	*0.33*	*0.43*
FIRST COMM.	*0.33*	*0.41*	*0.41*	*0.47*	*0.42*	*0.36*	*0.43*	*0.40*
GIRO	*0.36*	*0.42*	*0.48*	*0.34*	*0.39*	*0.24*	*0.33*	*0.37*
GUARDIAN	*0.41*	*0.34*	*0.48*	*0.40*	*0.32*	*0.28*	*0.26*	*0.36*
GULF	*0.49*	*0.36*	*0.46*	*0.37*	*0.31*	*0.32*	*0.31*	*0.37*
HABIB	*0.34*	*0.35*	*0.43*	*0.33*	*0.26*	*0.23*	*0.41*	*0.34*
HABIB2	*0.31*	*0.28*	*0.26*	*0.31*	*0.23*	*0.23*	*0.25*	*0.27*
IMPERIAL	*0.42*	*0.41*	*0.35*	*0.38*	*0.39*	*0.32*	*0.33*	*0.37*
I&M	*0.41*	*0.40*	*0.46*	*0.42*	*0.43*	*0.38*	*0.42*	*0.42*
KCB	*0.50*	*0.48*	*0.45*	*0.46*	*0.40*	*0.40*	*-1.58*	*0.16*

K-REP	*0.37*	*0.40*	*0.42*	*0.44*	*0.36*	*0.40*	*0.43*	*0.40*
MIDDLE EAST	*0.48*	*0.45*	*0.47*	*0.48*	*0.45*	*0.42*	*0.43*	*0.46*
NBK	*0.49*	*0.49*	*0.47*	*0.45*	*0.47*	*0.44*	*0.43*	*0.46*
NIC	*0.46*	*0.47*	*0.44*	*0.44*	*0.45*	*0.41*	*0.41*	*0.44*
ORIENTAL	*0.47*	*0.50*	*0.46*	*0.49*	*0.43*	*0.48*	*0.47*	*0.47*
PARAMOUNT	*0.44*	*0.40*	*0.43*	*0.46*	*0.48*	*0.10*	*0.35*	*0.38*
PRIME	*0.41*	*0.44*	*0.48*	*0.41*	*0.48*	*0.39*	*0.37*	*0.43*
SCB	*0.48*	*0.47*	*0.48*	*0.47*	*0.44*	*0.42*	*0.43*	*0.45*
TRANS-NATIONAL	*0.46*	*0.43*	*0.50*	*0.46*	*0.49*	*0.36*	*0.31*	*0.43*
VICTORIA	*0.38*	*0.34*	*0.41*	*0.30*	*0.31*	*0.33*	*0.32*	*0.34*
industry mean	*0.43*	*0.43*	*0.46*	*0.35*	*0.41*	*0.37*	*0.34*	*0.40*