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BANK PERFORMANCE AND INSURANCE UPTAKE NEXUS: AN EMPIRICAL ANALYSIS OF KENYA

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ABSTRACT

Banks and insurance companies are part of a country's financial system; they both provide intermediation services by converting savings into investment funds. By this, they are expected to be linked. However, few papers have ventured into this especially in the African continent and in particular, the Kenyan context. This study therefore, sought to fill this gap by investigating the causal relationship between bank performance and insurance uptake using quantitative approach without pre-determined causal direction. This was separated into the relationship between banks' activities and life insurance uptake as well as that between banks and nonlife insurance uptake. Consequently, life insurance density and nonlife insurance density were the two measures of insurance uptake while; banks performance was assessed through ROA, ROE and private credit density. Analysis applied relied on time series data obtained mainly from the Kenya's annual statistical abstracts for the period 1974-2019. Effectively VAR and VECM models were applied. Granger causality tests were used to determine the causal direction. Insurance uptake was found largely to have no causal relationship with bank performance in the long run. This was however not the case in the short run, where bank performance was found to granger cause insurance uptake in most of its variables. With this in mind, both insurers and the banking sector stand to benefit from measures aimed at strengthening the banking sector in Kenya and such they should be encouraged.

Key Words: *Bank performance, Bancassurance, Credit risk and Financial intermediation.*

INTRODUCTION

The importance of banks to a modern economy cannot be over-emphasized. These financial intermediaries play a key role in connecting lenders and borrowers channelling funds to various economic activities which leads to growth (Azman-saini & Smith, 2010). In addition to their intermediation roles, banks also stimulate growth by providing safe payment systems and means for governments to control money supply through monetary policies. Banks are even more important in developing countries where other financial institutions are less developed and inaccessible to most borrowers (Greuning & Bratanovic, 2003). In such countries, their health directly determines that of the entire financial sector such that their mass failure is likely to lead to economic downturn. Studies have already linked mass bank failures to economic crisis (Bernanke, 1983).

Though slow to develop compared to the banking subsector, insurance industry is as important in a country's financial sector. A well-developed insurance subsector is as critical to a country's economic growth as other financial institutions (Levine, 2000; Cristea, Marcu & Cârstina, 2014; Lester, 2014; Weistbart, 2018), more so for developing countries like Kenya (Han et al. 2010). According to Ćurak, Lončar and Poposki (2009), insurance companies' contribution to growth happens through the following channels. First as financial intermediaries, insurance companies (especially life insurance companies) are able to mobilise funds from many small savers and use the money to either directly fund big development projects or avail the funds to other big investors through their actions in the capital markets. Second, insurance companies offer risk transfer mechanisms which promote entrepreneurship, encourage risk taking, and ensures business continuation and speedy recovery in cases of losses from insured events. Transfer of risk also encourages innovation in risk management, less desirable but economically beneficial enterprise ventures (Haiss & Sumegi, 2008; Webb, Grace & Skipper, 2002). Finally, insurance companies enhances the development of other institutions by offering them protection from credit risks allowing them to expand credit to productive activities. Similar arguments to the above are found in Skipper (1997).

By virtue of being in the same industry, banks and insurance companies are expected to be connected through their performance. They offer products which (in a way) compete as well as complement each other (Azman-Saini & Smith, 2011). From the insurance side, a life insurance policy act as a substitute which competes with other saving services offered by banks (Chen, Lee & Lee, 2012). On the other hand, a property insurance policy strengthens the use of the property as collateral for a loan thus complementing the loan (Azman-Saini & Smoth, 2011; Webb, Grace, Skipper, 2002). Banks loans complement insurance as well and are the main justification for credit linked insurance common in agriculture insurance. Sarris (2014) found insurance to be less desirable if not linked with credit or any investment mechanism.

Consequently, the relationship between banks and insurance companies in a country will depend on the products offered in the two subsectors and whether they compete or complement. A financial sector dominated by competition between the products of the two subsectors will exhibit a negative relationship between banks performance and insurance uptake while, an industry where products complement each other will exhibit a positive relationship. No relationship is expected if the two subsector's products are not related. Besides product relatedness, banks relation with insurers have also been argued to depend on other factors. Webb, Grace, and Skipper (2002) associated this to a country's levels of income and its citizens' risk appetite. They noted high substitutability between banks' saving accounts and life insurance in low income high risk tolerant population thus an expected negative relationship between banks and insurance companies in low income countries.

In addition to the above highlighted substitutability and complementarity between the two, recent development in financial sector has made such relationship more explicit. Bank nowadays are allowed in most countries to directly collaborate and compete with insurers in a move to offer value to their clients and improve their performance (Gonulal, Goulder & Lester, 2012). Collaboration mostly happens where one sells the other's product for commission. One case with increasing popularity is 'bancassurance' where banks sell insurance

products for commission (Artikis, Mutenga & Staikouras, 2008; Gonulal, Goulder & Lester, 2012). There are also cases where insurance companies promote and facilitate processing of loans from certain banks through an insurance financing deal and earn commission in return. Besides collaborating, the two institution now compete directly in certain markets. In such markets, banks have expanded into insurance by operating insurance subsidiaries, generating and marketing their own insurance products or engaging in both. Insurance companies have as well ventured into banks' traditional market by for instant, marketing their own loan products directly or through their subsidiaries (Kist, 2001; Yuan, 2017). The US is a good case where bank face stiff competition from other financial institution which now also provide traditional commercial banking services (Markham & Broome, 2000; Yuan, 2017).

It is evident from the above that banks are expected to have a connection with insurance companies. This relationship remains intuitively and theoretically ambiguous hence its solution can only be found empirically. However, research in this area remains largely underdeveloped. It is only recently that researchers started showing interest with few papers coming in various part of the world (Sawadogo, 2020). First contributors in the area are found in the expansive finance-growth literature which generally aim to establish a link between a country's financial sector and economic growth. Their contribution (though incidental) are a consequence of their separation of financial sector into its components (i.e. banking, insurance subsectors, stock market, etc). Such studies include Adams et al. (2009); Pradhan, Bahmani and Kiran (2014); Kaushal and Ghosh (2017); Pradhan et al. (2017) and Pradhan et al. (2020).

Working with data from Sweden, Adams et al. (2009) found insurance activity to have a positive impact on the country's economic growth and banking sector. The same results were found by Kaushal and Ghosh (2017) in India. They found insurance development to positively affect long term development in the country's banking sector. However, no relationship was found between banks and insurance companies in the short run. Contradictory results are found in Pradhan, Bahmani and Kiran (2014); Pradhan et al. (2017) and Pradhan et al. (2020). Their evidence was more in favour of banks being beneficial to insurance companies. Pradhan et al. (2014) was for a panel of 17 G-20 members where a long run positive effect was found from banking to the insurance industry, with short run effects moving in both directions. Both Pradhan et al. (2017) and Pradhan et al. (2020) found no long run effects for a panel of 19 G-20 countries and 32 European countries respectively. In addition, both found a positive relationship to run largely from banking subsector to insurance subsector in the short run.

Besides finance-growth literature, direct studies linking banks and insurers have also emerged. A part from focusing on different population and time studies, some of these have added other factors likely to facilitate or dampen the bank-insurance linkage such as: a country's financial structure (Liu & Lee, 2019), and the extent of the country's exposure to the global market (Sawadogo, 2020). The already mentioned study by Liu and Lee (2019) found both life and non-life insurance to positively affect bank credit to the private sector in a majority of 36 countries in their sample. Their division of the sample based on financial structure revealed varying results especially in the short run making them to conclude that links between banks and insurers is country specific hence the reason for contradicting results in past literatures. While focusing on long-run effects alone, Sawadogo (2020) found bank credit to have positive long run influence on life insurance and total insurance uptake while having no impact on non-life policies. This was a panel study of 20 Sub-Saharan African (SSA) countries including Kenya which makes it the closest to our proposed study in focus and population. We deviated from it by focusing solely on Kenya. It is already argued that the differing results (in past studies) may be because of countries' diverse financial structure, stage in economic development and income levels (Liu et al. 2014; Liu & Zang, 2016; Liu & Lee, 2019) which make such results country specific (Liu & Lee, 2019). It is for this that Sawadogo's (2020) results, while informative, may not fit the Kenyan situation. We also go beyond long run effects and look at short run possibilities as well. Furthermore, we challenge the suitability of banks' private

credit as a measure of performance thus in addition, uses return on assets (ROA) and return on equity (ROE), which are well established performance indicator in the finance literature.

Theoretically, there is an expected linkage between players in the financial sector (Webb, Grace & Skipper, 2002; Prikazyuk & Olynik, 2017). Further, the linkage is to be more pronounced between the biggest players, this is what is expected between banks and insurance companies given their dominance in most financial systems. Arguably, the two offer related products which either compete and/or complement each other (Haiss & Sumegi, 2008, Liu et al. 2014). Loans and saving products (banks traditional services) have already been shown to compete and complement those of insurance companies. With the introduction of banc assurance, the link supposedly gets stronger. Insurance companies stand to benefit from it through increased sales while banks get more income through earned commission (Krstić, Vojvodić-Miljković & Mandić, 2011). Should this be true, then bank performance is expected to move together with insurance uptake. Existing empirical literature in Kenya have looked at effects of bancassurance on bank performance (Gitau, 2013; Mwangi, 2014; Nyakomitta, 2017) and, the effect bancassurance has on insurance uptake (Ombonya, 2013; Njeri, 2017; Orora, 2018) while ignoring how bank performance directly relate with insurance uptake. This study aimed at filling this gap. By taking note of product relatedness between insurers and bankers and the possible impact of bancassurance on either, we studied the relationship between banks performance and insurance uptake in Kenya.

LITERATURE REVIEW

Theoretical Literature

Theory of Production

Theory of production concerns the decision made by a firm in its production process. It explains how a firm determines the level of output and the level of inputs to use. Among the strong assumption made are that: firms exist mainly to make profit and so are profit maximizes, they are constrained in resources with alternative uses, and that every input is productive. Every firm in production uses a combination of inputs in a format determined by its available technology (Pindyck & Rubinfeld, 1995). There are numerous ways of combining inputs to produce the same level of output leading to the question of which combination to pick. The firm makes this decision by picking the combination that gives the maximum output given input costs and its available resources. Having determined the inputs to use, the next decision is how much output to produce. Firms are profit maximisers and so will select the level of output that gives the most profit. Profit is the difference between revenues collected from output sales and costs incurred in the production process. The firm will therefore produce at the point where marginal cost equals marginal revenue.

Banks and insurance companies are faced with these decisions as well. A bank must decide on what inputs to use and their respective levels, the technology to use and the level of output to apply. Under this theory, banks and insurance companies are analysed as normal firms in operation mainly to make profit (Andries, 2009). Banks attracts deposits they use as inputs to produce loans of various types sold at different interest rates (Andries, 2009). To diversify their portfolio, banks also provide banc-assurance services by engaging in the sale of insurance services. Banc-assurance uses insurance services (from insurance firms) as its key input. Viewed as other products, a bank's level of banc-assurance services will be at the level it begets its maximum profit. Similar logic follows for insurers using banking services as input to produce insurance products.

Theory of Consumption

The main concern in theory of production is how individuals make their consumption choices which include the goods to consume and levels to consume. The following are assumed: rationality, that a person derives utility from every good or service consumed; existence of list of preference; and that every consumer is constrained by his level of resources. He chooses the amount of goods or services that maximises his utility given his

resource endowment and the goods' prices. Subsequently, demand for a good or service depends on their prices and those of related products, available resources, consumer tastes and preferences.

Insurance is a service which gives a level of satisfaction to buyers. Buying insurance is made together with other purchasing decisions forming part of a consumer's list of preference. A person chooses to buy that level of insurance that maximises their level of satisfaction given its price, price of other products, and his resource endowment. Insurance demand therefore depends on: insurance premium, consumer income, consumers taste and preference, cultural and religious belief regarding insurance, credit availability and related products among others. Notably, anything that causes any of the above to change is expected to ultimately change insurance uptake. Banks actions can hence be modelled to affect insurance uptake through their role in consumer resource endowment and provision of related products. Banks affects consumers' resources endowment first through credit used for purchases including for insurance policies and second, by facilitating consumers' wealth creation through savings. Banks services at times compete and complement insurance services.

Theory of Financial Intermediation (Banks as Intermediaries)

Intermediation is the linking of two parties. In discussing banks as intermediaries, distinction is made in the services they offer. The two broad functions are: brokerage services, and transformation of asset quality (Bhattacharya & Thakor, 1992; Allen & Santomero, 2001). The latter relates with their role in offering loans. In this regard, banks transform short term liabilities, in form of deposits, to long term assets in form of loans and other credit facilities (Bhattacharya & Thakor, 1992). This is what is always implied most of the time when discussing the role of banks; how such create liquidity within an economy without compromising long term investments. Through this, bank loans fund business activities including purchase of insurance products.

Turning to brokerage function. A broker is an intermediary whose role is to bring two parties with complementary needs. Theories of financial intermediation see brokers and other financial intermediaries to be results of market imperfection (Andries, 2009; Scholten & Wensveen, 2003) characterised by information asymmetry, high transactional cost, and market regulations. Information asymmetry is the most important imperfection. Banks come in to fill this information gap since their operation and experience makes them better informed than either of the parties (Scholten & Wensveen, 2003). The banks are allowed to intermediate since they are able to screen and interpret market signals better and are better at reusing information they have acquired over time from similar transactions (Andries, 2009). For this, the banks are paid commission.

The relationship between a bank and an insurance company through banc-assurance is an explicit example of financial intermediation through brokerage services. Common banc-assurance agreements usually have three parties: a buyer in need of insurance services, an insurer with the service and, a bank which merely connects the two parties. Even though in most cases it is the bank which the buyer knows, the bank is never a party to such insurance agreements (Fiordelisi & Ricci, 2011: Gonulal & Krishnamurthy, 2012). Insurance companies are theorised to prefer banks to other channels because of the following (Lester, 2014). Banks are able to use client relationships and information built from previous interactions to market insurance products better than other intermediaries. Second, such relationships help banks provide better product matches to clients' needs. Thirdly, banks have wide and better distributional channels used for their traditional products which they can use to market insurance services better. Lastly, they can leverage on their traditional products by selling such products with insurance services as a package (Lester, 2014).

Empirical Literature

Economic Growth-Finance Nexus Studies

Relevant contribution from this group emanates from studies that included banks and insurance companies as separate entities within the financial sector and, went ahead to inspect the relationship between the two

subsectors. Such contributions are seen from Adams et al. (2009); Kaushal and Ghosh (2017); Pradhan, Bahmani and Kiran (2014); Pradhan et al. (2017); and Pradhan et al. (2020).

Set in Sweden, Adams et al. (2009) sought to investigate the relationship between insurance, commercial bank lending and economic growth for the period 1890-1998. They used time series data, modelled their relationship under VAR and performed Granger causality as proposed by Toda and Yamamoto (1995). They found insurance to positively influence bank lending and economic growth. Their respective variables for insurance and banking subsectors were: insurance density (measured as the real annual value of collected premium per capita) and bank lending (taken as total loans to non-bank public per capita). Similar results were found by Kaushal and Ghosh (2017) in India who sought to investigate the relationship between the country's economic growth and developments both in the banking and insurance sectors. They used monthly data from July 2004 to June 2013 which they analysed using VECM. Banking development was measured by private credit, insurance development by total monthly collected premium while economic growth was measured by the country's industry production index. Development in the insurance sector was found to positively affect bank development.

Pradhan, Bahmani and Kiran (2014) used data from 1980 to 2012 for 17 G-20 countries which they analysed individually for each country as well as for the panel. The objective was to find out how banks' activities relate with those of insurance and how this affects economic growth. Six measures of insurance sector activity were used i.e. life insurance density, non-life insurance density, total insurance density, life insurance penetration, non-life insurance penetration, and total insurance penetration. For banks activity, they used broad money supply as a percentage of gross domestic product. VECM was used to model the relationship and estimated both by fully modified OLS (FMOLS) and dynamic OLS (DOLS). Causality was reported to run in either direction for all measures of insurance sector except total insurance penetration in the short run. In the long run, banks had influence but only on life insurance development. All measures of non-life and total insurance were found insignificant, a pointer to the difference between life and non-life insurance. We to follow this by analysing life separate from non-life insurance. We however, left out total insurance given its likely correlation with both life and non-life insurance measures especially the dominant policy.

In what looked like an improvement of the above, Pradhan et al. (2017) studied the relationship between activities in the insurance sector, banking industry and economic growth in all 19 G-20 countries for 1980-2014 period. Here, four measures of insurance activities were used: life insurance density (both life and non-life), and insurance penetration (both life and non-life). For banking activities, they were measured by: credit to the private sector, banks' total domestic credit, and total domestic credit provided by the financial sector. Both VECM and panel VECM were used for country and panel analysis respectively and estimation done through FMOLS and DOLS estimators. Long run results were not significant for the panel and most of the countries except China and Saudi Arabia, where banks had positive influence on insurance uptake. In the short run, unidirectional causality was found from banking activities to insurance sector for both developed and developing country panel as well as in 11 countries. Unidirectional causality from insurance sector to banks was found in 5 countries and bidirectional causality in 3.

Prathan et al. (2020) added stock market in their investigation of causal relationship between economic growth and financial markets reform in 32 European countries. This was for the period 1996 to 2016 and was analysed by VAR. Unlike their previous work, they used competition between banks to measure development in the banking industry as opposed to banks credit used previously. These included: Lerner index, Boone indicator, five-firm concentration ratio, three-firm concentration ratio, and foreign ownership. Life insurance penetration, non-life insurance penetration, and total life penetration were used to measure development in the insurance sector. No relationship was found between bank competition and insurance development in the long run. In the short run, competition in the banking industry was found to largely improve development in the insurance sector. All the three measures of insurance penetration had statistically significant unidirectional effect from at least

one measure of banking competition. In addition, bidirectional relationship was found between nonlife insurance and three of the five bank competition measures as well as between total insurance penetration and one bank competition measure. The only unidirectional effect from insurance sector to the banking industry was shown by total insurance penetration, total insurance penetration had unidirectional effect on two measures of banking competition.

Studies on Interlinkages between Players in the Financial Sector

Unlike contribution from growth literature which primarily targeted the financial sector as whole, this group primarily targeted the individual players within the sector. This is the direction we take hence consider them more relevant to our objective. Some of the studies in this group are: Lorent (2010); Liu and others (2014); Liu and Lee (2019); Sawadogo (2020), and Lidiemo (2018).

Lorent (2010) sought to study the additional determinants of life insurance a cross-section for 90 countries (developed and developing) in 2005. Its main focus and thus contribution was the addition of four measures for banking sector. These included private credit (as a measure of financial development), banking sector efficiency, bank concentration, and banks' regulation. Bank efficiency was measured by: net risk margin, bank income cost ratio and overhead cost, return on assets (ROA), return on equity (ROE) and bank-z-score. Bank concentration measured by dividing the assets of the three largest banks by their industry's total assets. Bank regulation was measured by: a bancassurance dummy, ease of entry index, and supervisory regulation index. Demand for life insurance was measured by life insurance density. They estimated a log-log demand function.

Their results showed strong positive effect of bank development on demand for life insurance, this was even stronger for developed countries as compared to developing one. Most of the banks efficiency measures were not significant except banks z-score which was found negative for the whole group, negative for developed countries subsample but, positive for the sample of developing countries. Finally, allowing bancassurance within banks was found to significantly increase demand for life insurance, for the group and both developed and developing countries.

Liu et al. (2014) investigated the relationship between bank credit and insurance activity in G-7 countries using annual data from 1980-2007. Their variables include real insurance density separated into life and non-life and real banking credit density. To perform their analysis, they used a rolling window boostrapped VAR/VECM mainly to due to their short period of analysis. Granger causality done as proposed by Toda and Yamamoto (1995). In the long run, they reported a bidirectional causal relationship between bank credit and insurance density. This was for both life and non-life insurance separately. In addition, banks effect was found stronger on life insurance than on non-life while non-life insurance effect on bank credit was stronger than the effect life insurance had on bank credit. In the short run, no relationship of any kind was found in the UK, the US and Canada. For France and Japan, causality ran from insurance activities (life and non-life) to the banks while it ran from banks to life insurers in Italy, and moved in both ways for nonlife insurers and banks in Germany. This led the authors to conclude that such causality is country specific, a conclusion we support hence our focus on Kenya.

Besides investigating the link between insurance activities and banking credit, Liu and Lee (2019) went ahead and examined how financial structure affected such linkages. This was for a panel of 36 countries for 1980-2015 period. To capture the structure, they separated their sample into bank-based and market based financial systems; and further into developed financial and undeveloped financial systems. Consequently, they ended up with four subsamples; market-based developed systems, bank-based developed systems, market-based undeveloped systems, and bank-based undeveloped financial systems. Real insurance premiums per capita, (insurance density) and real banking credit per capita (banking credit density) were the respective measures of insurance activities and banking credit. Analysis performed under VAR and dynamic OLS (DOLS) estimators.

Closer home, Sawadogo (2020) used data from a panel of 20 Sub-Saharan African countries (including Kenya) covering 1990 to 2017. The intention was to establish a relationship between private credit and insurance activities. In addition, the study examined how the relationship was affected by country's level of globalisation. Insurance activity was measured as annual premium per capita (life, nonlife and total) while banking credit density was used for banks. Results were found by estimating an insurance demand function modelled as an autoregressive distributed lag (ARDL) series with the factors being bank credit plus others as control. Banks credit was found to have long run positive and significant effect on total insurance activity. At the same time, this effect was found to increase with the level of a country's openness to the global market. Only long run results were reported. While Sawadogo (2020) paper included Kenya in its sample, we feel that its results may not transfer directly to Kenya.

In Kenya, Lidiema (2018) examined the intra-market linkages within the country's financial sector. Besides banks and insurance (which are our focus), he also included the stock and forex market. He mainly looked at how shocks are transmitted within the sector and how shocks from each player affects the rest individually. In that respect, he constructed impulse response functions based on the Bayesian VAR (BVAR) model. This was from monthly data from January 2004 to December 2016. The relevant variables included banks' lending (total loans) for banks and net insurance premium for the insurance subsector. Shocks originating from insurance premium uptake were found to affect credit uptake. At the same time, shocks emanating from loan uptake were found to affect insurance uptake. Interest rates shocks got transmitted to all the four subsectors. While the direction in which shocks transmit between two sectors is a likely indication of a relationship, such relationships do not amount to causality. We did more than establish shock transmission, we established a causal relationship between banks and insurance companies.

METHODOLOGY

Theoretical Model

Given that this study's unit of analysis are firms (banks and insurance companies), the model is based on theory of production. The intention is to link bank performance with uptake of insurance under the theory. Even though the discussion can be shown from either banking or insurance sector, the discussion is approached from the banking side. In this sense, a model profit oriented bank is assumed. In its operations, the bank has to decide on the level of inputs to employ to maximise profit given a targeted output level. Ultimately, it is shown how banks performance relate with insurance services through a model bank's factor demand function. An exposition of this follows, this borrows from Varian (2005) in logic.

The following assumptions are made: the bank produces one output represented by B (e.g loans) sold at price P. In doing this, it uses two inputs: insurance services represented by S and others represented by X. Input prices are W_1 and W_2 for insurance and others respectively. Further, the bank's is assumed to have a Cobb-Douglas production function of the form below.

$$B = S^{\alpha} X^{\beta} \quad (1)$$

Equation 1 also represents the banks targeted output levels. Production is at the point where the bank maximises it profit. Its maximisation problem is:

$$Max\ PB - SW_1 - XW_2 \quad (2)$$

Replacing for B in equation 2 by equation 1 gives:

$$Max\ P.S^{\alpha} X^{\beta} - SW_1 - XW_2 \quad (3)$$

Solving (3) produces the following first order conditions:

$$Pa\, S^{\alpha-1}X^{\beta} - W_1 = 0 \quad (4a)$$
$$Pb\, S^{\alpha}X^{\beta-1} - W_2 = 0 \quad (4b)$$

Multiplying 4a by S and 4b by X and replacing for $S^{\alpha}X^{\beta}$ by B, equation 4a and 4b is rewritten as 5a and 5b respectively

$$PaB = SW_1 \quad (5a)$$
$$PbB = XW_2 \quad (5b)$$

From 5a and 5b arises the factor demand functions for insurance (S*) and others (X*) respectively in 6a and 6b.

$$S^* = \frac{PaB}{W_1} \quad (6a)$$
$$X^* = \frac{PbB}{W_2} \quad (6b)$$

As seen in 6, the optimal level of each input demanded by the bank directly depends on the price of bank's output (P) and its level of output (B) and, indirectly on the respective factor prices (W_1 and W_2). Assuming further that all banks in Kenya behave the same as the representative bank model above, equation 6a becomes the banking industry demand function for insurance services showing the industry's consumed insurances to depend on its level of output. Assuming bank output price (P) and the price of insurance services (W_1) as given, equation 6a can be transformed to equation 7. This is the banking industry demand function for insurance services.

$$S^* = \mu B \quad (7)$$

Notably, banking activities could be shown as a function of insurance services following the above argument for a representative insurance firm. Thus insurance depend on banks while at the same time banks output depend on insurance services.

Model Specification

By expanding equation 7, the relationship between banks performance and insurance uptake can be presented in a simple empirical model in equation 8, taking into consideration that past values are often better explanatory variables than current values (Granger, 1969).

$$s_t = \beta_0 + \sum_{p=1}^{P} \emptyset\, s_{t-p} + \sum_{p=1}^{P} \beta_p\, b_{t-p} \; + \; \varepsilon_t \quad (8)$$

Where S_t a measure of insurance uptake is, b_{t-p} is the lags of bank performance (our sole explanatory variable to insurance uptake)[1], $\emptyset \; and \; \beta_p$ representing parameters to be estimated, ϵ_t representing the error term and the subscript t being time series denotation. A similar equation can be written for bank performance (S_t) given that bank performance can also be affected by insurance uptake making our model a system of two equations.

[1] Current studies under VAR tend to include only the variables of concern. Omitted variable problem is rarely a concern since the primary intention of VAR as argued by Sims (1980) is to investigate alternative models not premised on full information (Christiano, 2012). Secondly, better forecasting is possible with few parameters, and thirdly, bias from such variable truncation has been shown to be of negligible concern (Christiano, 2012).

Therefore, equation 8 is transformed under a model which allows such investigation concurrently. VAR is such a model. VAR model assumes no directional relationship by treating all variables as endogenous (Verbeek, 2004), endogeneity is thus not a problem in VAR models. Further, unlike structural equations, VAR are always identified (Verbeek, 2004). VAR model sets every variable as a function of its own lagged values, lagged values of the other variables and, an error term. It has as many equations as the number of variables being investigated. Equation 9 gives a general presentation of a VAR model.

$$y_t = A_0 + \sum_{p=1}^{P} A_1 \, y_{t-p} + e_t \qquad (9)$$

Where y_t represent a vector of endogenous variables (in our case, s_t and b_t), A_p a matrix of estimated parameters, and a vector of an error terms e_t . To estimate VAR, the variables have to be stationary otherwise the results are meaningless (Binh, 2013). But since most economic time series and non-stationary, VAR is rarely used with observed time series values. One solution is to eliminate non-stationarity by getting first differences of the variables before running VAR. Differencing is only appropriate when the variables are not cointegrated, for cointegrated variables, one must introduce an error correction component into the VAR (Verbeek, 2004). In that case, equations 9 is modified to 10 by introducing an error correction component. Equation 10 is a general presentation of an error correction model (ECM).

$$\Delta y_t = C_0 + \sum_{p=1}^{P} C_1 \Delta \, y_{t-1} + \gamma EC + \, v_t \qquad (10)$$

Where: Δy_t is a vector of differenced endogenous variables; C_0 and C_1 are estimated parameter; EC a vector of error correction components; γ is error correction parameter (also in vector); and v_t the vector of error terms. The error correction parameter measures adjustment to deviations from long run relationship. Estimation of the unrestricted VAR (equations 9) or ECM (equation 10) depended on the results of statistical tests. Both VAR and VECM were used.

FINDINGS AND DISCUSSIONS

Descriptive Statistics

Descriptive statistics depicted that non-life insurance uptake was higher than the life uptake with means of 557.99 and 344.68 respectively. A situation attributed partly to legally mandatory covers like motor insurance and their importance in protecting business property. Life insurance is mostly taken on personal basis. Consequently, credit uptake is much higher than total uptake of insurance policies in the country a pointer to the development of Banks in relation to other players in the country. With respect to business volume, the banking sector in the country is more developed than insurance sector. The summary statistics are shown in table 1.

Table 1: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
ROA	46	17.13%	0.58%	0.49%	2.69%
ROE	46	17.43%	8.00%	1.41%	34.92%
Life insurance density (Ksh.)	46	344.68	496.45	11.91	1,889.36
Nonlife insurance density (Ksh.)	46	557.99	700.60	19.96	2,368.26
Credit density (Ksh.)	46	13,615.86	18,397.99	298.84	60,944.79

Model Estimation Results

Prior to models estimation, Augmented Dickey Fuller Unit Root Test and KPSS test established were non-stationary except ROE which was stationary. ROE was differenced once to make it stationary. Subsequently, co-integration test was performed to investigate long run relationship between banks and insurance companies. Each bank performance variable was tested singly with every insurance uptake variable under Engle-Granger framework. Cointegration was found between credit density and life insurance density and also between credit density and nonlife insurance. Following this, we proceeded to estimating VAR models with differenced values for ROA and life insurance; ROA and nonlife insurance; ROE and life insurance; and ROE and nonlife insurance. For credit density, it relationships with life and nonlife insurance density were investigated under VECM as it was found to be co-integrated with each.

VAR Estimation of ROA and Life and Non-life Insurance Density

Table 2: VAR Results on ROA and Life & Non-life Insurance Density

	Model One ROA	**Model Two Life Insurance**	**Model Three Non-Life Insurance**
ROA L1.	-0.1565017	0.3483918*	0.1011599
	(0.1458896)	(0.1675048)	(0.0925331)
ROA L2	--	--	0.0074044
	--	--	(0.0933874)
Life Insurance L1	-0.1487767	-0.3112944*	--
	(0.1187623)	(0.1363583)	--
Non-Life Insurance L1	-0.0399326	--	-0.1383454
	(0.2518742)	--	(0.1477722)
Non-Life Insurance L2	-0.2621414	--	-0.3813608***
	(0.2496735)	--	(0.1464811)
Constant	0.0181938	0.1461738***	0.1603495***
	(0.0457616)	(0.0525416)	(0.0356016)
F-test on ROA equation (p=0.2671), F-test on life insurance density equation (p=0.0073)		*F-test on ROA equation (p=0.7042), F-test on Nonlife insurance density equation (p=0.0441)*	

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model one and Model two results depicted that ROA entered the equation with a positive sign while life insurance had a negative sign. Consequently, ROA positively affects life insurance by a lag of 1 year while life insurance's past figures reduces those of its subsequent one year. This however does not amount to overall causality of ROA on life insurance. Granger causality was therefore done to gauge the direction, which established that there is a unidirectional causal relationship running from ROA to life insurance density in the short-run. Given that the parameter on ROA in model two positive and significant, it means that ROA positively affects life insurance density in the short run.

Model three report results on the relationship ROA has with nonlife insurance. ROA equation failed the test hence statistically unlikely to represent the relationship. Further, only the second lag of nonlife insurance and the constant were found statistically significant on the nonlife insurance equation. The lag of nonlife was negative on its own function meaning that premium collected each year has a downward effect on what is collected on the second following year.

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VAR Estimation of ROE and Life & Non-life Insurance Density

As was reported from the stationarity test results, ROE was found stationary while life insurance density had a unit root. Working with their level values present a problem. As a result, both were differenced like in the above two estimations already discussed even though ROE needed no differencing to be used under VAR. It was differenced to levels it value with that of life insurance density.

Table 3: VAR Results on ROE and Life and Non-life Insurance Density

	Model Four	**Model Five**	**Model Six**
	ROE	**Life Insurance**	**Non-Life Insurance**
ROE L1.	-0.3037398*	0.3323052***	0.1765210***
	(0.1556709)	(0.1030583)	(0.0954424)
ROE L2	-0.0092690	0.0411258	0.0413269
	(0.1593730)	(0.1055092)	(0.0542335)
ROE L3	0.1129066	-0.0063939	--
	(0.1417688)	(0.0938547)	--
ROE L4	-0.2762592*	-0.1672475*	--
	(0.1392776)	(0.092206)	--
Life Insurance L1	0.1797436	-0.7354177***	0.2950702
	(0.2290700)	(0.1516505)	(0.4093901)
Life Insurance L2	0.2763331	-0.7525399***	-0.1029187
	(0.2460717)	(0.1629061)	(0.3857756)
Life Insurance L3	0.1685654	-0.6217887***	--
	(0.2475204)	(0.1638652)	--
Life Insurance L4	0.0895534	-0.2624424*	--
	(0.2284681)	(0.1512520)	--
Non-Life Insurance L1	-0.2622255*	--	-0.1339265
	(0.1533220)	--	(0.1355865)
Non-Life Insurance L2	-0.0637910	--	-0.4251340***
	(0.1637526)	--	(0.1277656)
Constant	-0.0769637	0.3824826***	0.1694097***
	(0.1101293)	(0.0729085)	(0.0316097)
ROE equation was weakly significantly fitted (p=0.0575), life insurance density equation fit was strongly significant (p=0.000)		*F-test on ROE equation (p=0.3766), F-test on Nonlife insurance density equation (p=0.0001)*	

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

From the results in Model four and model five, two parameters were found significant on ROE equation i.e. first lag of ROE and its 4th lag all with negative signs. With regard to life insurance equation, all its lagged values plus the constant were statistically significant at least at 10% significance level. First ROE lag (at 1% sig level) and its 4th lag (at 10% sig level) were also significant on the life insurance equation. Further, all the life insurance lagged values had negative signs similar to the ROA-life insurance case reported earlier. Nonlife

insurance lag was also negative on its own equation when modelled with ROA. Granger causality test depicted strong unidirectional causal relationship moving from ROE to life insurance density (at 1% significance level). This means more life insurance services are bought as bank investors earn more from their investment in banks. On the model of ROE and Non-Life insurance density, three parameters were significant at 1% significance level: first lag of ROE on nonlife insurance equation with a positive sign, second lag of nonlife insurance on its on equation with a negative sign, and a positive constant. ROE was found to granger cause nonlife insurance uptake in the short run. The positive sign on the short-run parameter, implies this to be a positive causal relationship. No causality moved from Nonlife insurance to ROE same as lack of evidence on concurrent causality between the variables.

VECM Results of Credit Density and Life & Non-Life Insurance Density

In analysing the relationship between credit density and life insurance, we used VECM. The variables were found to have a long run relationship as based on co-integration results, making VECM the appropriate model to establish their relationship. Unlike in the previous sections, we do not report results from the formal lag selection criteria; we ignored their selection for failing to result in better models. Instead, our selection was based on trial and testing. Both AIC and BIC settled on 1 lag the use of which was found to suffer from autocorrelation. Based on Gonzalo's (1994) recommendation of adding the number of lags when faced with auto-correlated VEC model, we experimented with additional lags up to 4 lags. Use of lags beyond 4 risked reducing our sample size, which at 45 (for differenced values) was already small.

Table 4: VECM Results of Credit Density and Life & Non-Life Insurance Density

	Model Seven **Credit density**	**Model Eight** **Life Insurance**	**Model Nine** **Non-Life Insurance**
Adjustment Parameter One	-0.1423328*	0.4921620***	--
	(0.0634044)	(0.1871490)	--
Adjustment Parameter Two	-0.3150921*	--	0.4674590*
	(0.1480663)	--	(0.2105853)
Diff. Credit Density L1 One	0.1178046	-0.1588867	--
	(0.149644)	(0.4417003)	--
Diff. Credit Density L2 One	0.392997***	-0.3820820	--
	(0.1514487)	(0.4470270)	--
Diff. Credit Density L1 Two	0.2045641	--	0.1170435
	(0.1728576)	--	(0.2458444)
Diff. Credit Density L2 Two	0.3379870*	--	0.2753800
	(0.1593865)	--	(0.2266853)
Diff Life Insurance L1	-0.1824289***	-0.1134725	--
	(0.0634523)	(0.1872906)	--
Diff Life Insurance L2	-0.1357217*	-0.1433066	--
	(0.0554868)	(0.1637790)	--
Diff Non-Life Insurance L1	-0.1164433	--	0.0728335
	(0.1375498)	--	(0.1956284)
Diff Non-Life Insurance L2	-0.0448229	--	-0.2169478
	(0.1171782)	--	(0.1666552)
Constant	0.1428236***	0.0413045	0.0556209
	(0.0361064)	(0.1065742)	(0.0465358)

The long run adjustment parameters were significant and of the expected signs given the sign of life insurance parameter on the co-integrated relationship. In this sense, the two variables were found to adjust each other towards their respective equilibrium level in the long run. In other words, there is a bidirectional positive causal relationship between life insurance uptake and private credit. In the short run, the following parameters were found significant: the second lag of credit density on its own equation (positive sign); all the two lags of insurance density on bank credit density equation (negative sign) and the constant on the credit function. Granger causality test was performed to establish if these amounted to causal relationship. The process involved joint F-test on the coefficient of the lagged explanatory variable' differences. A unidirectional causality was found from life insurance to credit expansion at 1% significance level. This effect is negative as evidenced by the negative sign on life insurance coefficient in the bank credit equation. In other words, bank credit tends to reduce as more people take life insurance services.

All the adjustment parameters have the expected signs besides being statistically significant. Therefore, nonlife insurance density and credit density corrects each other's values in the long run therefore, a bidirectional causality between them. In the short run, no parameter was found significant on the nonlife insurance equation while both the second lag of credit density (with a positive sign) and the constant term were significant on the credit density equation. Lagged coefficients of respective explanatory variables were found were not significant in both equations. Consequently, there was no short-run causality between credit density and nonlife insurance density.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

No long-run causal relationship was found between ROA and life insurance density same to that between ROA and nonlife insurance density. At the same time, no causal tie was found between ROE and life insurance or between ROE and nonlife insurance. The only long-run effects were found between credit density and life insurance density and; between credit and nonlife insurance density. In a short, of the three bank performance measures, only one was found to have causal linkage with the insurance uptake measures. Consequently, little evidence exists in support of a long run causal link between bank performance and uptake of both life and nonlife insurance services in the country. This contradicts both complementarity and substitutability hypotheses which see the actions of either a bank or insurer to enhance or diminish performance of the other.

This conclusion is largely not in contradiction with past studies on the topic as it seems. It is only that it included two variables (ROA and ROE) largely left out in economic literature, though dominant in bank performance related finance literature. Confining our conclusions to the most commonly used banking performance variable (credit density) make the results in agreement with a number of past studies. For instance; Liu et al. (2014), Liu and Lee (2019) and Sawadogo (2020) that measured bank performance as bank credit. Since Pradhan et al. (2020) found no relationship between banking competition and insurance uptake, insurance uptake may be seen to affect bank credit in the long run without affecting the bank's overall performance. Still, Pradhan et al. (2019) failed to find any long run relationship in 17 out of 19 G-20 countries while using bank credit density.

Turning to short run results (with respect to Granger causality), nonlife insurance showed no statistically significant causal relationship with both bank credit and ROA. It was however found to be affected positively and unilaterally by ROE. Since nonlife insurance had no causal relationship with two of three selected banks variables, we answer our second research question by concluding lack of a causal relationship between bank performance and nonlife insurance in the short run. With regard to the first objective, life insurance was found to be influenced positively both by ROA and ROE while on its part positively affecting short term bank credit. In this case, causality chiefly moved from bank performance to life insurance hence the conclusion of a short run positive effect of bank performance on Kenyan life insurance uptake.

Generalising the above to achieve the study's main objective, bank performance was found to granger cause short term insurance uptake in three instances (from ROA to life, ROE to life and ROE to nonlife insurance uptake); there was one instance of insurance uptake influencing banks (from life to bank credit) and; two instance of non-causality between the two sectors (between credit and nonlife and, ROA and nonlife). Therefore, banks' performance has an overall positive impact on the country's short run insurance demand. Such may be attributed to the large size of the banking sector with respect to that of the insurance industry. Alternatively, the effect may be because more banks have ventured into in insurance business compared to insurers engaging in banking services.

Policy Recommendations

Results presented here show that Kenyan banks and insurance companies are largely independent when viewed in a longer time perspective. This is despite bank credit being connected with the level of insurance uptake in the long run. Insurers however, seem to depend on the banking sector in the short run without themselves having any influence on banks. Therefore, it is critical that when formulating policies aimed at promoting insurance uptake, then the country's bank performance should be considered. Nonetheless, such should have a short term outlook as the effect is likely to fade in the long run except for bank credit. Long term insurance outlook should only consider private bank credit.

Policy makers for the country's banking sector should on their part never lose sight of the country's long term insurance uptake particularly those aimed at improving credit access in the long term. Effects of insurance uptake should be considered when formulating such policies.

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