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Market Expectations versus Outcomes: Sectoral Credit Market Analysis in Kenya

Caroline Kariuki and Samuel Tiriongo[1]

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Abstract

This study examined the responsiveness of commercial banks' sectoral credit supply to changes in credit demand expectations, as captured in the Central Bank of Kenya's Quarterly Credit Officers Survey. The study developed an index to measure changes in credit demand expectations and subjected the index, as a regressor, to a sectoral credit supply model. Employing panel data spanning 9 sectors - agriculture, manufacturing, real estate, trade, mining & quarrying, building and construction, transport & communication, finance and insurance and households, for the period between March 2012 and March 2020, the study estimated a random-effects model of sectoral credit supply. Estimation results showed that private sectoral credit supply in Kenya increases with an increase in credit demand expectations, other factors remaining constant, while expectations of a decrease in credit demand decelerate the growth in private sector credit. The effect of expectations on actual credit outcomes is significant after a delay of 2 quarters. Based on these results, developing a clear understanding of what shapes economic agents' expectations would be instrumental in influencing commercial banks' private sector credit growth.

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1.0 Introduction

In developing markets, the availability and access to credit are recognised as a prerequisite for economic development, as it enables economic agents to engage in economic activities and improve standards of living (Srinivas, 2015). Moreover, the presence of credit plays a significant role in capital investment, thus driving economic growth. Ayyagari, Demirguc-Kunt and Maksimovic (2012) argue that bank finance remains the major source of external funding for firms across all sizes in developing countries. This is because the existing corporate bond and securities markets in these countries are relatively underdeveloped and typically accessed by larger firms in need of long-term funding on an occasional basis.

In this regard, understanding the evolution of bank credit demand and supply over time is critical. This has typically been associated with changes in supply-side factors, such as balance sheet constraints, external financing costs, competitive pressure, and demand-side factors such as the weight of other types of financing, as well as how credit standards are adhered to and modified through regulations (Burdeau, 2015). But in an environment of uncertainty, the role of expectations becomes essential - whether the expectations are adaptive or rational. With growing sophistication in the conduct of monetary policy across many countries and improving transparency in the relay of relevant information, market players increasingly continue to deviate from adaptive towards rational expectations platforms. For a rational expectations model to be considered consistent, the predictions of variables of interest – say credit demand, would be the same as that of the decision-maker - say a credit supplier, given the supplier's information set, the nature of the random processes involved and the model structure. Since most macroeconomic modelling today studies decisions under uncertainty and over long periods, capturing expectations of economic agents – individuals, firms and even government institutions, about future conditions have become an essential component. But one central assumption has to be appreciated; that agents form expectations in a systematically unbiased way and collectively use all relevant information (Evans & Ramey, 2006).

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In literature, it's agreed widely both in theory and empirical evidence that the banking sector plays a critical role in financial intermediation, investment and economic growth, particularly in countries where capital markets are underdeveloped. Central to the critical contribution of the banking sector is the ease with which households and firms access to credit. In the intermediation process, and particularly loan extension process, banks process different sets of loan client information based on their capacity, with large foreign-owned banks employing more sophisticated standard quantitative models to assess the creditworthiness of customers compared to the small local banks. These trends are common in developing and emerging markets (Haas et al., 2010; Srinivas, 2015).

The notion of market expectations continues to be adopted in analyses of credit market developments. Ferrando, Ganoulis and Preuss (2019) acknowledge that for most markets, even for those at low levels of development, economic agents in the formation of their expectations give more priority to their expectations about the future of the banking system, sometimes even more than the immediate impact of the announced policy measures. However, there remains scanty information in the literature that has applied this thought particularly in analysing variables of interest, such as credit extension, particular so for developing markets.

Credit provision in Kenya is mainly driven by commercial banks that dominate the financial system, controlling on average 87 percent of total loans extended to the private sector as at the end of 2019 (Tiriongo, 2019). Additionally, the credit market in Kenya has undergone some evolution in terms of institutional, regulatory and policy environment and financial product offerings. Some of the notable institutional, regulatory and policy environment include: (i) the collapse of three medium-sized banks between 2015 and 2016; (ii) the market-driven consolidation via mergers and acquisitions; (iii) the adoption of the International Financial Reporting Standards(IFRS9) since January 2018 that mainly affected loan provisioning, and; (iv) the era of interest rate caps between September 2016 and November 2019 that weakened the effectiveness of monetary policy and created perverse credit market outcomes (CBK, 2018). Other developments that have directly or indirectly affected the credit market in Kenya include the continuing mainstreaming of technological innovations particularly those leveraging on the mobile money platforms in banking services, the creation of a cost of credit website in 2017 hosted by the Kenya Bankers Association to enhance transparency in the pricing of loans and support competition, and the adoption of the Banking Sector Charter since January 2019.

Linked to the credit market dynamics is the role of monetary policy decisions or actions. The conduct of monetary policy in Kenya continues to transform, with the adoption of forward-looking monetary policy frameworks and strategies. This has seen an enhancement in the use of market information with the incorporation of key economic agents' perceptions

and expectations, playing a critical role in monetary policy decisions. The CBK on a bi-monthly and quarterly basis captures credit market demand expectations in its Monetary Policy Committee's Private Sector Expectations and the Quarterly Credit Officers Surveys (QCOS), respectively. The QCOS that is conducted every quarter seeks to capture commercial banks credit officers' expectation on demand for credit, alongside perceptions on other credit market factors such as credit standards, interest rates, asset quality, credit recovery efforts, deployment of liquidity, among others.

From the preceding, the developments both at policy, institutional, regulatory and product offerings continue to affect the credit market in Kenya. More so, commercial banks' credit officers hold certain expectations and perceptions on credit demand that change over time. However, the extent to which banks employ the information on credit demand expectations in their actual credit supply decisions remains empirically uncharted. This study, in general, examines the role of credit demand expectations in the actual credit supply outcomes of the banking sector. More specifically, it delves into each sector's credit supply model in a panel of the critical sectors of the economy, introducing a credit demand expectations index as a predictor of credit supply.

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2.0 Literature Review

In recognition of the challenge in unravelling market expectation formations, the rational expectations theory, fronted by Muth (1961), links outcomes partly to what agents expect to happen. In particular, the argument is that outcomes do not differ systematically from expectations. Additionally, the rational expectations theory relies on the assumption that agents (say credit officers) behave in ways that maximise their utility or profits. Commonly applied in the determination of business cycle analyses Keynes described expectations as 'waves of optimism and pessimism' that played a central role in the determination of the level of economic activity. The notion of rational expectations has been used extensively as a building block for the 'efficient markets' or 'random walk' theories' applications on income and inflation analyses and in the design of economic stabilisation policies (Sargent, 1986).

Later, Evans and Honkapohja (2001) put forward the adaptive learning theory, arguing that agents learn by making forecasts using observed data and updating their forecasts over time in response to errors. Interestingly, Mankiw and Reis (2002) use the sticky information model to show that only a share of agents rationally update their information, while the remaining agents stick to plans based on old information, because of costs associated with acquiring and processing new information (Antonecchia, 2018). Branch (2004) proposed the rationally heterogeneous expectations theory, which suggests that agents rationally select variables they use to form their expectations. Moreover, the heterogeneity among agents depends on the costs and benefits of evaluating these variables (Antonecchia, 2018). In this regard, an assessment of the level of utilisation of new information (say market demand expectations) in decision making and thus market outcomes (say on credit supply) depend to a large extent on whether the lending agents (credit officers) are 'sticky' to old lending frameworks or adaptive to new information, notwithstanding the costs associated with either option.

Besides, it is also important to understand how the credit channel of monetary policy transmission operates, as it affects lending. Research from Mwega (2014) highlights that there are two ways through which the credit channel can operate in the economy. The first is by affecting overall bank lending (bank lending channel). Mwega (2014) explains that under the bank lending channel, an increase in the central bank rate may be accompanied by a reduction in bank reserves, thus compelling banks to reduce lending. In Kenya, the study by Sichei and Njenga (2012) shows the existence of the bank lending channel, with monetary policy having a stronger effect on the loans from banks with less liquid balance sheets. Further, loans from a bank with low total capital to risk-weighted assets ratio are affected more by monetary policy. The second way through which the credit channel operates is by affecting the allocation of loans (balance sheet channel). For example, the findings from Abuka et al. (2019) reveal a quantitatively and statistically significant bank balance sheet channel in Uganda. Specifically, monetary contractions reduce bank credit supply, tightening loan volume and rates.

More broadly, many empirical studies on the credit market of both developing and developed countries have identified various factors that may affect the supply of credit in an economy. These factors are based on the stance of monetary policy, bank-specific characteristics, and macroeconomic variables, as well as the regulatory and prudential environment. Empirically, Amidu (2014) whose research focused on Sub Saharan Africa (SSA), shows that bank credit to the private sector is influenced by the bank size, bank liquidity, the stance of monetary policy, growth of the bank and the efficiency of its management. Furthermore, a study by Everaert et al. (2015) shows that supply-side factors have gained prominence over demand-side factors in explaining credit outcomes. Specifically, the supply-side factors considered include the real lending rate, interest margin, inflation expectations, economic conditions as captured by confidence surveys, changes in stock market indices, real GDP growth, and real estate prices. The authors also considered the NPL ratio, the real deposit and the banking system's capacity to lend.

Elsewhere, Bustamante, Cuba and Nivin (2019) also show the prominence of supply-side factors, with well-capitalised, high-liquidity, low-risk and more profitable banks as the most important variables in credit supply. But additionally, regulatory requirements such as reserve requirements are an effective tool in influencing domestic credit. Consistent with the findings of Amidu (2014), Abuka et al. (2019) found that monetary contractions reduce bank credit supply in a study of the relationship between monetary policy operations and bank lending. The studies by Bustamante, Cuba and Nivin (2019) and Abuka et al. (2019) also show that the effects of monetary contractions are stronger for banks with low capital and large exposure to sovereign debt. Holton, Lawless and McCann (2012) indicate that perceptions about the availability of finance are also determined by economic growth. However, the level of private sector indebtedness and sovereign yields

both significantly affect credit supply. In particular, over-indebtedness affects supply decisions through the bank balance sheet channel while, terms and conditions of financing through a borrower's balance sheet channel. All these studies did not examine the role of credit demand expectations by economic agents.

In the Kenyan context, Misati and Kamau (2015) show that the ownership structure, changes in the housing price index and the size of the bank are the main determinants of commercial bank lending. While this study too did not account for the role of market information in credit supply, the assessment of the information available to both lenders and borrowers - jointly or separately - continues to gain traction in literature. For instance, Munene (2017) found that Credit Reference Bureaus play a significant role in the identification of risk, rate of credit repayment, credit access, reduction of moral hazard and credit information evaluation by commercial banks in mitigating against credit default.

In recognising the role of market information and the need to understand the credit market dynamics over time, the Central Bank of Kenya (CBK) undertakes a Quarterly Credit Officer Survey (QCOS) which gathers information from credit officers from all commercial banks on credit market dynamics- an information set that is important for formulating relevant policies. In this survey, several factors that affect the credit demand in the economy are identified, which include internal financing, loans from banks, loans from non-banks, issuance of debt securities, issuance of equity, cost of borrowing, available investment opportunities and the level of political risk. Based on these surveys, CBK argues that, in deciding whether or not to extend a loan to an applicant, commercial banks take into consideration factors such as the bank's cost of funds and balance sheet constraints, the bank's capital position, competition from other banks, competition from other credit providers, the central bank policy rate, political risk, investment in government securities and expectations regarding the general economic activity (CBK, 2019).

Moreover, in the interplay between credit supply and demand, expectations have been identified to play a significant role. For instance, Ferrando, Ganoulis and Preuss (2019) analysed how firms form expectations on the availability of bank finance. While rejecting the rational expectations hypothesis, the study suggests that firms update their expectations based on the latest information in their information set. Earlier, a study using a panel of German, Spanish, French and Italian firms by Antonecchia (2018) found that credit demand expectations are heterogeneous and depend on factors such as the structural characteristics of the firm, changes in the balance sheet indicators, mainly profits, labour costs and interest expenses, and firm-specific private signals such as general economic outlook, own enterprise-specific outlook, enterprises own capital and credit history. Based on the arguments fronted thus far, credit demand expectations are heterogeneous across firms - by extension sectors, are adaptive or rational depending on the information sets available and processed by

agents. Notably, both studies argued in support of the appropriateness of adaptive expectations hypothesis in credit demand expectations formations, where past access to credit forecast errors was found to influence the firms' current expectations. However, the extent to which this information influences lenders in the same market remains unclear.

An analysis of the literature reveals that, while the role of expectations in the credit supply market has been elevated, previous studies particularly those on the credit market in Kenya, have not taken into consideration as to whether or not commercial banks incorporate the market demand for credit expectations in their actual credit supply processes. This, in particular, is an important component to assess since the transmission of monetary policy actions relies on the expectations that agents have on future economic conditions (Alvarez et al., 2016). In this regard, ignoring agents' expectations would have adverse effects on the overall effectiveness of monetary policy. This study attempts to capture the extent to which lenders incorporate market demand expectations in their credit supply process in Kenya.

3.0 Research Issue

As earlier noted, the CBK in its conduct of forward-looking monetary policy incorporates market expectations in its policy decisions. The Central Bank conducts the MPC market perceptions survey on a bi-monthly basis and a credit officers' survey on a quarterly basis - the QCOS. These surveys capture, among other factors, private sector firms' expectations on credit demand.[2] Based on the QCOS survey responses over time, the CBK has assessed and listed – not empirically - the factors that influence loan growth, to include bank's cost of funds and balance sheet constraints, capital position, competition from other banks, competition from other credit providers, the central bank rate, investment in government securities and expectations regarding the general economic activity (CBK, 2019).

What remains unexamined, which forms the basis of this study, is an empirical evaluation of the bank's responsiveness in actual credit supply to credit market demand expectations. A mismatch between credit demand expectations and actual private sector credit supply would reflect a negation of the rational expectations theory. This would call for a review of the dynamics of economic agents' market information formation patterns, that would be influenced by, among others, sector-specific dynamics. The research question is, do Kenyan commercial banks incorporate market demand for credit expectations in their actual credit supply? In this regard, this study examines the effect of credit market demand expectations on actual credit supply by Kenyan commercial banks, while controlling for bank-specific characteristics, sector-specific factors, and macroeconomic factors.

2 The Survey is usually administered through questionnaires sent by email and hard copy, to the Chief Executives of 381 private sector firms comprising of 39 operating commercial banks, 1 mortgage finance institution, 13 micro-finance banks and 328 non-bank private firms. The Survey questionnaires were completed by either Chief Executive Officers, Finance Directors, or other senior officers from the sampled institutions who have knowledge on the economy and the business environment.

4.0 Methodology

Based on both theoretical and empirical literature reviewed in the previous section, bank credit supply is broadly determined by factors that describe the banking sector, the macroeconomic environment, and the credit demand expectations. Therefore, the following model was considered:

$$cred_{it} = \beta_0 + \beta_1 banksector_{it} + \beta_2 macro_{it} + credit\_dd\_expect_{it} + \alpha_i + \mu_{it} \quad \text{...(1)}$$

Where $cred_{it}$ is private sector credit supply to sector i at time t; $banksector_{it}$ is a vector that comprises the banking sector characteristics that include the average lending interest rate (lendrate) and deposits interest rate (deprate), market liquidity ratio (liq_ratio), profitability (profit_roa), credit risk (npls_ratio) and total assets (total_assets). The vector $macro_{it}$ represents macroeconomic variables hypothesised to affect credit supply, comprising the central bank rate (cbr) that reflect the monetary policy stance, investment in government securities by the banking sector (govsec) to capture alternative investment options available for the banking sector, the average 91-day Treasury bill rate (tbill) to measure the returns on investment alternative to private sector lending. This variable is also considered as some form of an implicit benchmark for pricing bank loans, the NSE 20-share index (nse) to capture stock market performance; an alternative source of funds, particularly for firms. All these factors are cross-sectional invariant. The vector also includes sectoral real sectoral GDP (rgdp) that is cross-sectional variant and the rate of inflation (infl) to measure the economic conditions under which lending is happening. The variable that captures changes in credit demand expectations is $credit\_dd\_expect_{it}$ for sector i at time t. While most of these variables are cross-sectional invariant (i.e., central bank rate, lending rate, deposit rate, liquidity ratio, profitability, credit risk (npls_ratio), total assets, treasury bill rate, NSE 20-share index, investment in government securities and inflation), a few, such as credit supply, real sectoral GDP and credit demand expectations, vary across the groups. Notably, all the variables vary through time. α_i measures the

random deviation of each sector's intercept term from the common intercept term β_0, while μ_{it} is the residual term for sector i at time t.

Model (1) is a panel data model that calls for the use of panel data estimation techniques. Baltagi (2020) outlines the benefits of panel data on two critical fronts. First, the use of panel data approaches allows one to account for the heterogeneity across individual cross-sectional units. In this study, this feature offers an opportunity to examine any variations that may exist across sectors in the credit supply process. Second, the structure of panel data- cross-sectional data observed over time- expands the data points, thus allowing more degrees of freedom and reducing co-linearity that may exist among the independent variables. This introduces some efficiency gains on the estimated parameters. Variants of panel data approaches that broadly include fixed, random effects and pooled models are explored in this study, the best of which is chosen scientifically and used for analysis.

The fixed effects (FE) model allows the capture of cross-sectional specific effects in the regression estimates, as it includes the individual intercepts for each cross-section. In this model, two critical assumptions are made. First, that something unique within the cross-section may bias the predictor variables, and thus there should be no correlation between the individual's errors and predictor variables. Second, the time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. In this case, each entity is different from the other and therefore, its error term and constant (αi), which captures individual characteristics, should not be correlated with the others. In essence, the time-invariant variables are absorbed by the intercept, αi in the Model (1). If the error terms are correlated, then the FE model becomes unsuitable for analyses since inferences drawn from it may be biased. One weakness of this model is that based on its formulation, it omits all time-invariant variables (including the constant, β0) that may be important in the regression, and thus may introduce some omitted-variable bias in the regression. Other weaknesses include its failure to capture minimal within-cluster variations in the unobserved cross-sectional effects in the data (Stock & Watson, 2017; Kohler & Kreuter, 2009). Estimation of FE models is typically via least-squares- incorporating time or cross-sectional dummies where necessary.

Alternatively, a random-effects (RE) model allows for the capture of both the idiosyncratic (cross-sectional specific) time-constant effect that is assumed to be random, and the idiosyncratic time-varying random error. Unlike the FE model, the RE model assumes that the variation across entities is random and uncorrelated with the predictor variables in the regression. A RE model allows for the incorporation of time-invariant components in the regression, assumes that the variations across cross-sections (unobserved) are random and uncorrelated with the independent variables, i.e. for the model (1): $\text{cov}(\alpha_i, \text{sector}_{it}) = 0$; $\text{cov}(\alpha_i, \text{macro}_{it}) = 0$ and $\text{cov}(\alpha_i, \text{credit\_dd\_expect}_{it}) = 0$; and the parameter ($\beta_s$) standard errors are lower

than those obtained from the FE model. A RE model is best suited for cases where the unobserved individual effect embodies elements that are correlated with the predictor variables in the model (Greene, 2018). Its estimation is typically undertaken using the Generalised Least Squares (GLS).

From the preceding, the choice among FE model, RE model and a pooled model (that assumes no panel effects in the data) would be crucial. The Hausman test, that is commonly used in literature to choose between a FE model and a RE model, tests the null hypothesis that there the unique entity errors in the regression are not correlated with the regressors- i.e., that the preferred model specification would be a RE model, against the alternative that the errors are correlated (or that a FE model is preferred) (Greene, 2018).

5.0 Data and sources

In this data spanning the period, March 2012 to March 2020 is used for analyses, with the study period restricted by the period with comprehensive data on credit market expectations. Data on sectoral private sector credit extended by commercial banks, and responses in the QCOS on credit demand expectations, commercial banks investment in government securities, average lending rate, average deposit rate, treasury bill rate, Central Bank Rate, inflation, overall banking sector profitability, liquidity of the banking system, gross NPLs to total loans and total assets held by commercial banks data were all obtained from the CBK. Sectoral real GDP per sector data was obtained from the KNBS, while data on the Nairobi Securities Exchange (NSE) index data was sourced from the NSE.

The primary focus of this study was to examine the effect of credit market demand expectations on actual credit supply by Kenyan commercial banks. The CBK conducts the QCOS quarterly and obtains responses on the assessment of credit demand expectations per sector. The sectors considered for this study include agriculture, manufacturing, real estate, trade, mining & quarrying, building and construction, transport & communication, finance and insurance, and households. These sectors since 2014 accounted for an average of 65 percent of the GDP between 2014 and 2020 (KNBS, various)[3]. This, therefore, allows the study to map credit supply and market expectations for each of these sectors and make conclusions on the relationships. The data consists of 9 cross-sections (sectors) observed over 33 time periods (quarters), generating 297 observations for each variable. The list of variables together with their measurement and sources are shown in Table A1, while the basic summary statistics and the correlations matrix are presented in Tables A3 and A4 in the appendix, respectively.

The QCOS data on credit demand expectations is available in three categories reflecting the proportions per sector of respondents who indicate expectations of (i) increased credit demand, (ii) no change in credit demand, and (iii) decreased credit demand, coded respectively as 3, 2 and 1. In this study, we develop a

3 Various publications of the KNBS on Quarterly Real GDP, available on https://wwgreenew.knbs.or.ke/?page_id=1591

composite index based on a weighted mean of the responses that capture the three categories of responses (weights being the proportion of responses in each category). The index is the sum of the percentage of responses in each category computed per sector overtime. We then limit the index to vary between 1 and 3 on a continuous scale to allow the variable to be used in a regression analysis, based on views by Babbie (2008) and Chaudhary and Israel (2018).

A reading of the index between 1 and 2 indicates the increased proportion of respondents indicating an expectation of declining credit demand in each sector. In contrast, an index between 2 and 3 indicates an increased proportion of respondents indicating an expectation of increasing credit demand in each sector. An index at 2 reflects no change in credit demand expectations, an index measure of 1 indicates that 100 percent of the respondents expect credit demand to decline, and an index measure of 3 represents 100 percent of the responses showing expectations of increasing credit demand. Figure 1 presents a time series of the computed sectoral indices of credit demand expectations.

In addition, cross-tabulations of sectoral credit and the respective credit demand indices are presented in Table A2 in the appendix. An inspection of the trends shows a positive relationship between sectoral credit supply and credit demand expectations in general. However, the strength of the relationship varies from one sector to another.

Based on the summary statistics in Table A3, it is observed that most of the variables used in the analyses are cross-sectional invariant. Few variables, namely, private sector credit supply (the dependent variable), real GDP and market credit demand expectations (credit_dd_expect), vary across sectors. Flows of credit across the sectors varied between the credit of Ksh 20 billion and Ksh 477.3 billion reflecting somewhat non-uniform credit supply patterns employed by banks across sectors of the economy. In terms of economic activity, there are sectors whose overall level of activity is as low as Ksh 10.7 billion while others are over 10 times larger (largest sector GDP at Ksh 106 billion). This reflects diversity in the sectors that banks are faced with for credit supply considerations.

Our variable of interest, which is credit demand expectations (credit_dd_expect), as discussed earlier, is measured as a composite index of responses from a market survey conducted by the CBK on credit demand expectations. Three responses (increase, remain the same, decrease) are weighted by the proportion of responses in each category within a scale of 1 (for decrease), 2 (remain the same) and maximum 3 (for increase). From Table A3, it is clear that overall, expectations varied from 1.58 (reflecting expectations of credit demand declining) to 2.65; an indication of a surge in expectations of credit demand. The dichotomy indicates diverse perceptions and expectations by market players on credit demand and justifies our call to examine the influence of credit demand expectations by sector level players on commercial banks' credit supply process. The rest of the data summary statistics are shown in Table A3 in the appendix.

Table A4 in the appendix shows the pairwise

correlations across time of the variables of interest. It is evident that the lending rate is correlated (significant at 5%) with the CBR, treasury bill rate, profitability, NPLs ratio and total assets. These variables were, therefore dropped from the analyses without loss of critical information necessary for the study. In addition, the NSE index was also dropped from the analyses as it is correlated (significant at 5%) with government securities, the deposit rate, treasury bill rate, profitability, liquidity ratio, total assets and NPLs ratio. We proceeded with the remaining set of variables to ascertain the appropriate model.

6.0 Model Estimation Results

Prior to estimation, three options of panel data models; a pooled OLS model, fixed-effects model and a random-effects model were considered for analyses. Panel data model selection tests, as depicted by the results of the Hausman and Breusch-Pagan Lagrange Multiplier (LM) test show results in favour of a random-effects model. The random-effects model estimation results are presented in Table 1 below. This model is also estimated using Generalised Least Squares adjusting for robust standard errors to correct for any form of heteroskedasticity in the data that would otherwise bias parameter estimates.

Table 1: Model Estimation Results based on a Random Effects Model

	Model Coefficients
Log(Investments in Government Securities)	0.5470*** [0.1606]
Lending rate	1.0919** [0.5672]
Deposit rate	1.8310 [3.645]
Deposit rate (-1)	-3.3661* [1.7584]
Log(Real GDP)	0.2723** [0.1137]
Log(Real GDP)(-1)	0.0964 [0.0612]
Inflation rate	-0.1783** [0.0720]
Liquidity ratio	-1.3292*** [0.2525]
credit_dd_expect (-1)	0.0684 [0.0826]
credit_dd_expect_(-2)	0.1102** [0.0540]
Constant	4.1863*** [1.4483]
R-Squared	*0.5338*
Obs.	*295*
No. of groups	*9*
rho	*0.8014*
Hausman test Chi-Sq. stat. (Probability)	*6.98 (0.7271)*
Breusch Pagan LM test	*2471.10 (0.0000)*

NOTE: *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. Figures in square brackets are respective coefficient robust standard errors.

The results posted in Table 1, are based on a RE model chosen following Breusch-pagan LM and Hausman tests. The results show that sectoral credit supply in Kenya throughout the study (March 2012 and March 2020) was positively and significantly driven by the level of the average commercial banks' lending rate, level of investment in government securities, level of economic activity as measured by the sectoral GDP, and the lag of credit demand expectations by borrowers (significant at the 5% level). The signs associated with these variables are consistent with expectations and economic theory. In particular, the effect of an increase in the commercial banks' average lending rate across time and between entities by 1 percentage point incentivises banks to grow credit supply by 1.09 percent within the same quarter, other factors remaining constant. Similarly, an increase in the real economic activity across time and between entities by 1 percent on average attracts an additional credit supply of 0.27 percent. On the contrary, an increase in the average deposit rate (banks' cost of funds) mainly with a delay of 1 quarter, the rate of the 3-month annualised inflation and the average liquidity ratio discourage credit supply growth.

With regard to our variable of interest, i.e., the influence of credit demand expectations on credit supply, the results show that expectations of an increase in credit demand, significantly (at 5 percent level of significance) encourages banks to adjust upwards their credit allocations to sectors with a lag of 2 quarters. A coefficient of 0.11 for the credit demand expectations index implies that whenever credit demand is expected (say by 100 percent of the credit officers) to decline, i.e., when the index reads 1, credit supply would increase marginally by 0.11 percent. This means that expectations of a decline in credit demand decelerate credit growth. However, when all credit officers reflect a no change in credit demand expectations (i.e., when the index = 2), credit supply would still increase by 0.22 percent, reflecting the role of momentum created by demand expectations. Additionally, whenever all the credit officers expect credit demand to increase, credit supply would increase by 0.33 percent.[4] This reflects that expectations of an increase in credit demand accelerate credit supply. Additionally, there are cross-sectional specific factors that determine credit supply. Figure 2 shows that there are unique attributes in mining, agriculture, finance, and insurance, and building and construction sectors that depress credit supply. On the contrary, transport and communication, households, manufacturing, real estate, and trade seem to enjoy some attributes that on average support credit supply to these sectors.

4 This represents a case where there 100% of the respondents (credit officers for this case) report a decline, remain the same or increase in credit demand expectations.

7.0 Conclusions and Policy Implications

The objective of this study was to examine the responsiveness of commercial banks' credit supply to changes in credit demand expectations, as captured by the quarterly credit officers survey (QCOS) of the Central Bank of Kenya. The study developed an index to measure changes in credit demand expectations and subjected the index, as an additional regressor to a sectoral credit supply model. Employing panel data spanning 9 sectors-namely agriculture, manufacturing, real estate, trade, mining & quarrying, building and construction, transport & communication, finance and insurance and household sectors of the economy over 33 quarters (March 2012 and March 2020), the study estimated a quarterly random-effects model of sectoral credit supply.

Estimation results showed that sectoral credit supply in Kenya responds significantly when average commercial banks' lending rate increases, when sectoral real economic activity rises, and when demand expectations increase albeit with a lag of 2 quarters. In particular, a 1 percent increase in the average lending rate across time and between entities increases commercial banks credit supply by 1.09 percent - a finding that is consistent with an upward-sloping supply, and empirical evidence (see findings by Bustamante, Cuba and Nivin, 2019 and Tan, 2012 and CBK, 2019). Additionally, an improvement in economic activity, by say 1 percent increases credit demand by 0.27 percent. This implies a demand-pull effect on credit so that higher economic activity sectors are more attractive to credit providers. The finding of a pro-cyclical relationship between economic growth and credit supply is consistent with results obtained by Calza et al. (2010) and Cottarelli et al. (2005).

The variable of interest in the paper; credit demand expectations measure, is found to relate significantly and positively with changes in credit supply but with a lag of 2 quarters. An increase in credit demand expectations accelerates the growth in credit to the private sector, but a decrease in credit demand expectations decelerates

the growth in credit supply. The positive relationship is consistent with findings by Everaert et al. (2015) for the case of Central, Eastern and South-Eastern European countries who argue that weak credit growth is mainly explained by weak credit demand.

Based on the above set of results, we can draw several policy implications. First, pricing of credit as reflected in the overall commercial banks average lending rates are critical in influencing credit supply. In this case, the need to understand the building blocks to the price of credit is paramount if any efforts to support credit expansion are to bear fruit. Second, understanding sectoral economic performance, that inherently reflects the ability of an investment to generate a return, would be instrumental in turning around credit growth. This finding is consistent with views held by Abdul and Ochenge (2020). Sector-specific focus reviews particularly those seeking to unbundle sector growth prospects, and any risk elements would be a significant step in supporting credit growth in the economy.

Third, and which forms the incremental contribution of this study is the role of credit demand expectations. Credit demand expectations, as assessed by commercial banks credit officers, being found to influence credit supply significantly, implies that banks respond to demand expectations. In particular, the results showed that sectoral credit supply in Kenya increases with an increase in credit demand expectations, other factors remaining constant, while expectations of a decrease in credit demand decelerate the growth in private sector credit. The effect of expectations on actual credit outcomes is significant after a delay of 2 quarters. In this regard, developing a clear understanding of what shapes economic agents' expectations would be instrumental in influencing commercial banks' private sector credit growth.

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Appendix

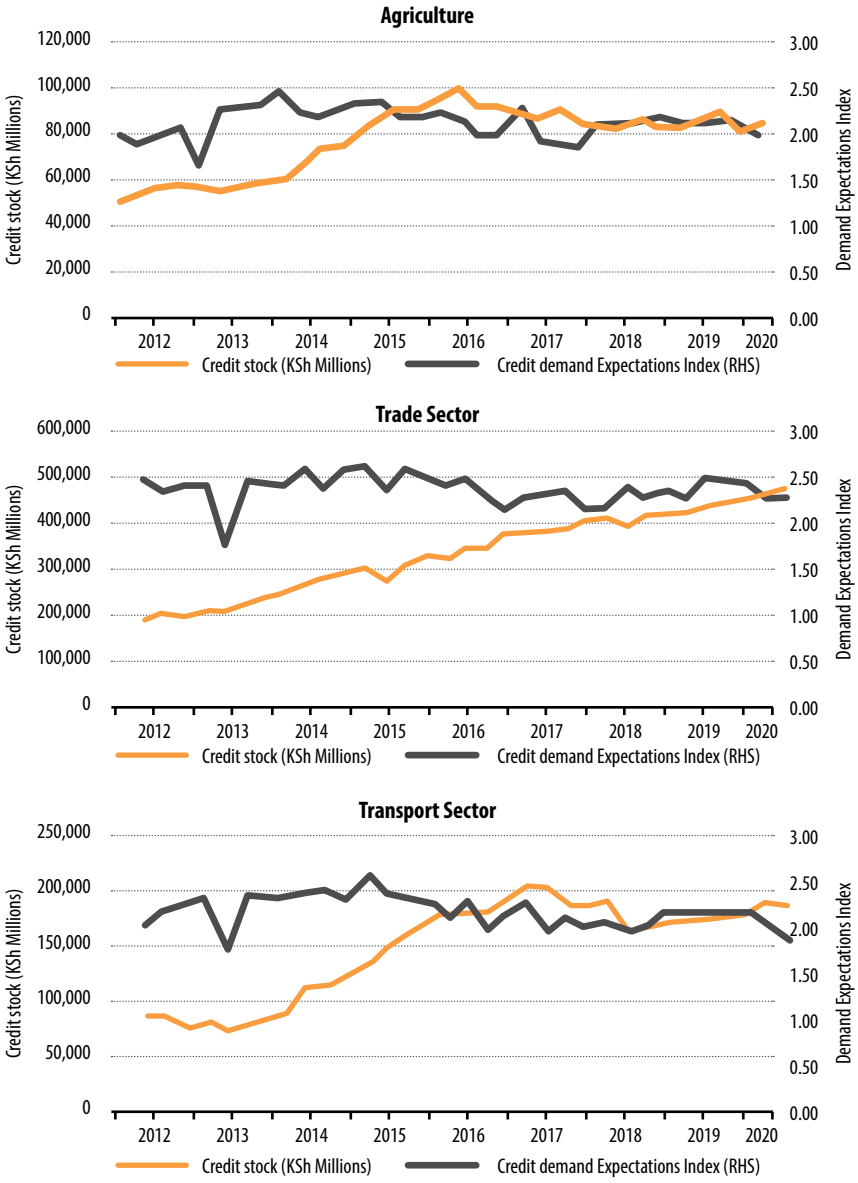
Table A1: Data Description, Measurement and Sources

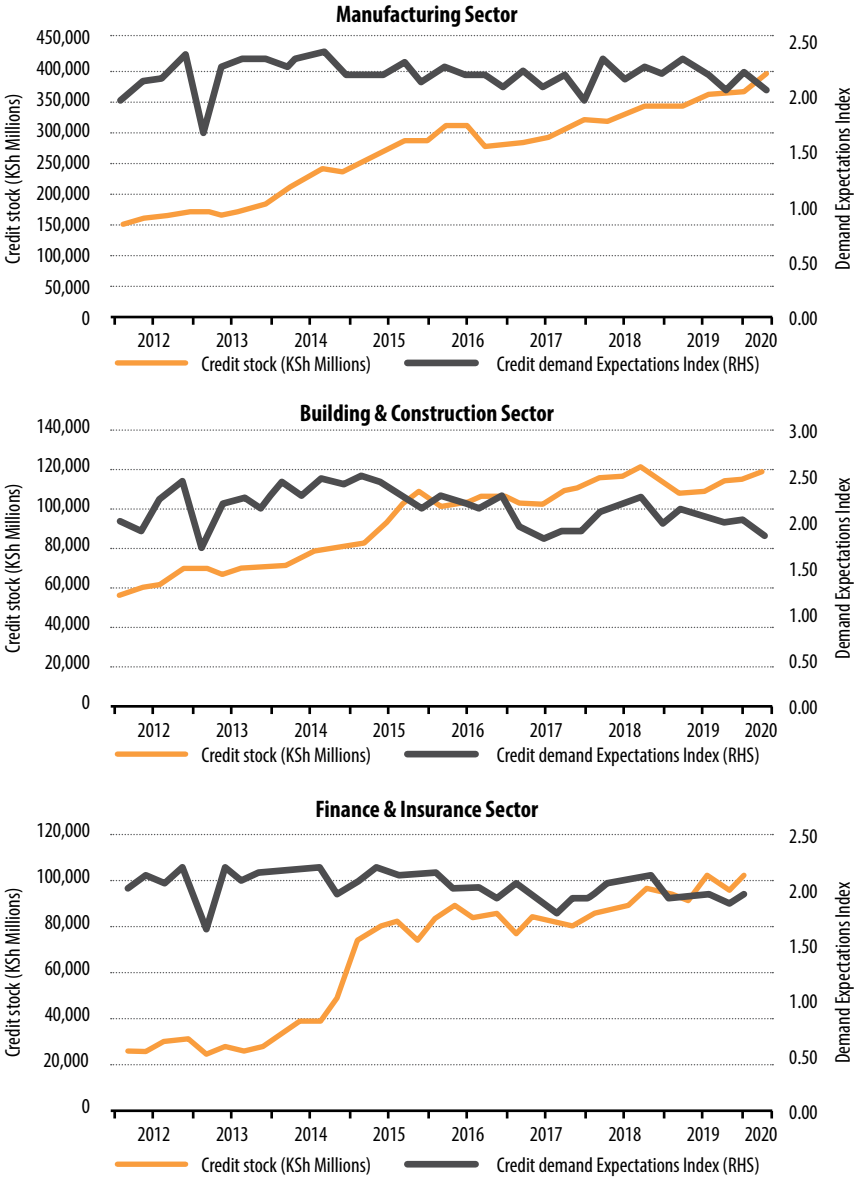
Variable	Data label	Measurement	Source
Total sector private sector credit (Dependent variable)	credit	Stock of private sector credit to sector i by the entire banking sector.	CBK
Private sector credit demand expectations	credit_dd_expect	Responses to the CBK QCOS. It is reflected by a composite index of responses on credit expectations that varies from 1 to 3 (2 reflects no change in expectations, 1 shows decline in credit demand expectations while 3 shows expectations of an increase in demand).	CBK
Banking sector characteristics			
Lending rate	lendrate	Quarterly average commercial banks' lending rate	CBK
Deposit rate	deprate	Quarterly average commercial banks' deposit rate (measures the average cost of funds for banks)	CBK
Liquidity	liq_ratio	Commercial banks average liquidity ratio (measured by the ratio of short term assets to short term liabilities and captures the overall liquidity conditions in the system)	CBK
Profitability	profit_roa	Commercial banks average return on assets	CBK
Non-performing Loans (NPLs) ratio	npls_ratio	Total banking sector gross NPLs to total gross loans (measures the level of credit risk in the market)	CBK
Total assets	total_assets	Overall banking sector total assets (measures commercial banks capacity to extend loans)	CBK

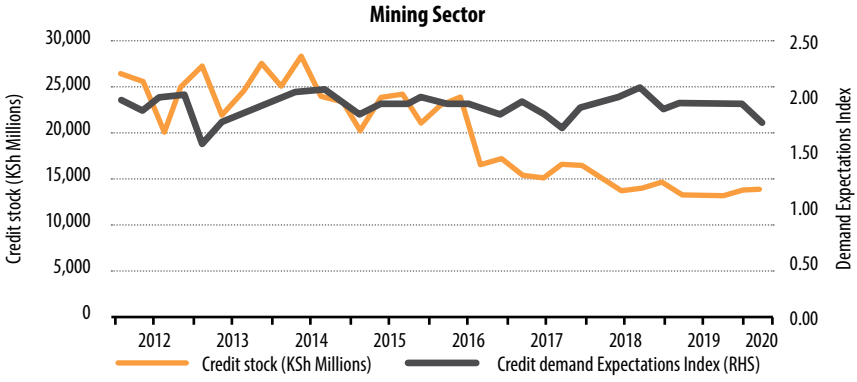
Variable	Data label	Measurement	Source
Macroeconomic variables			
Central bank rate	cbr	The central bank rate as at end of quarter (measures the stance of monetary policy)	CBK
Total investments in Government securities	govtsec	Total investments in government securities by banking system	
Real GDP	rdgp	Real GDP for sector i (Measures the level of economic activity in each sector)	KNBS
Inflation rate	infl	3-Month annualised overall rate of inflation (measures inflationary pressure over 3 month period)	CBK
Treasury bill rate	tbill	91-day treasury bill rate	CBK
Stock market index	nse_index	Nairobi Securities Exchange (NSE) 20 share index (measures performance of the alternative source of funds for credit clients)	NSE

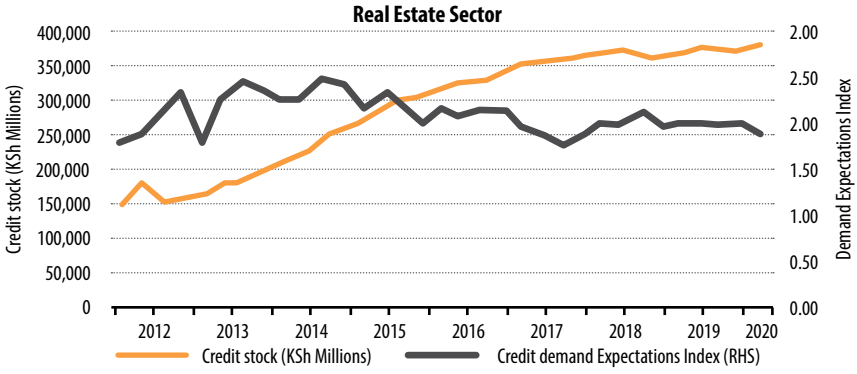
Source: Central Bank of Kenya (CBK), Kenya National Bureau of Statistics (KNBS), Nairobi Securities Exchange (NSE)

Table A2: Relating Sectoral Credit stock to Credit Demand Expectations




Manufacturing Sector
Credit stock (KSh Millions)
Demand Expectations Index
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
2.50
2.00
1.50
1.00
0.50
0.00
2012
2013
2014
2015
2016
2017
2018
2019
2020
Credit stock (KSh Millions)
Credit demand Expectations Index (RHS)
Building & Construction Sector
Credit stock (KSh Millions)
Demand Expectations Index
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2012
2013
2014
2015
2016
2017
2018
2019
2020
Credit stock (KSh Millions)
Credit demand Expectations Index (RHS)
Finance & Insurance Sector
Credit stock (KSh Millions)
Demand Expectations Index
120,000
100,000
80,000
60,000
40,000
20,000
0
2.50
2.00
1.50
1.00
0.50
0.00
2012
2013
2014
2015
2016
2017
2018
2019
2020
Credit stock (KSh Millions)
Credit demand Expectations Index (RHS)


Mining Sector
Credit stock (KSh Millions)
Demand Expectations Index
30,000
25,000
20,000
15,000
10,000
5,000
0
2.50
2.00
1.50
1.00
0.50
0.00
2012
2013
2014
2015
2016
2017
2018
2019
2020
Credit stock (KSh Millions)
Credit demand Expectations Index (RHS)


Real Estate Sector
Credit stock (KSh Millions)
Demand Expectations Index
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
2.00
2.50
2.00
1.50
1.00
0.50
0.00
2012
2013
2014
2015
2016
2017
2018
2019
2020
Credit stock (KSh Millions)
Credit demand Expectations Index (RHS)

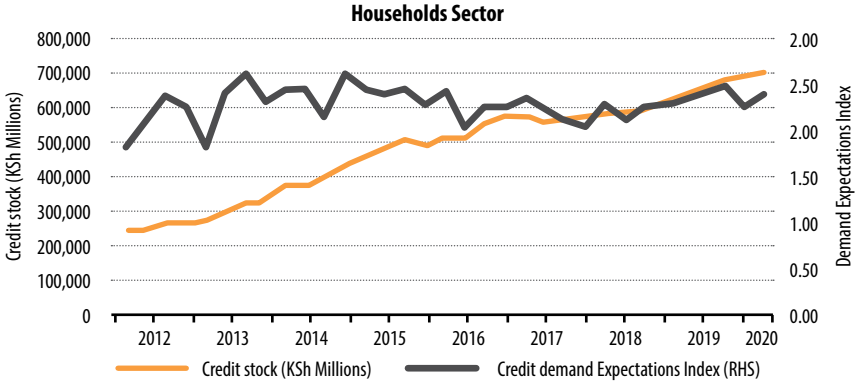

Households Sector
Credit stock (KSh Millions)
Demand Expectations Index
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
2.00
2.50
2.00
1.50
1.00
0.50
0.00
2012
2013
2014
2015
2016
2017
2018
2019
2020
Credit stock (KSh Millions)
Credit demand Expectations Index (RHS)

Table A2: Relating Sectoral Credit stock to Credit Demand Expectations

Variable		Mean	Std. Dev.	Min	Max	Observations
Credit supply	overall	197831.6	160210.6	13277.53	694735.1	N = 297
	between		153337.1	20003.67	477304.2	n = 9
	within		68534.95	-40932.08	415262.5	T = 33
Govt securities	overall	666.3085	270.5451	287.2664	1155.524	N = 297
	between		0	666.3085	666.3085	n = 9
	within		270.5451	287.2664	1155.524	T = 33
Lending rate	overall	0.0960753	0.0617277	-0.0537467	0.234693	N = 297
	between		0	0.0960753	0.0960753	n = 9
	within		0.0617277	-0.0537467	0.234693	T = 33
Deposit rate	overall	0.0120185	0.0570909	-0.117046	0.1227543	N = 297
	between		0	0.0120185	0.0120185	n = 9
	within		0.0570909	-0.117046	0.1227543	T = 33
CBR	overall	0.1006818	0.0232908	0.0725	0.18	N = 297
	between		0	0.1006818	0.1006818	n = 9
	within		0.0232908	0.0725	0.18	T = 33
Real GDP	overall	196977.8	315191.3	6752	1350941	N = 297
	between		329415.1	10686.45	1060504	n = 9
	within		50621.56	-15816.85	487415.2	T = 33
Inflation	overall	0.0596782	0.0558269	-0.05321	0.1903	N = 297
	between		7.36E-18	0.0596782	0.0596782	n = 9
	within		0.0558269	-0.05321	0.1903	T = 33
T-bill	overall	0.0909496	0.0244534	0.0653167	0.1935145	N = 297
	between		0	0.0909496	0.0909496	n = 9
	within		0.0244534	0.0653167	0.1935145	T = 33

Variable		Mean	Std. Dev.	Min	Max	Observations
Profitability	overall	0.0307035	0.0059158	0.0215563	0.0442395	N = 297
	between		3.68E-18	0.0307035	0.0307035	n = 9
	within		0.0059158	0.0215563	0.0442395	T = 33
Liquidity ratio	overall	0.4150681	0.0514988	0.3328539	0.5145	N = 297
	between		0	0.4150681	0.4150681	n = 9
	within		0.0514988	0.3328539	0.5145	T = 33
NPLs ratio	overall	0.0680794	0.0280284	0.0350364	0.1254	N = 297
	between		0	0.0680794	0.0680794	n = 9
	within		0.0280284	0.0350364	0.1254	T = 33
Total assets	overall	3539281	837346.7	2081456	5001489	N = 297
	between		0	3539281	3539281	n = 9
	within		837346.7	2081456	5001489	T = 33
NSE index	overall	3833.357	894.992	1966.12	5255.62	N = 297
	between		0	3833.357	3833.357	n = 9
	within		894.992	1966.12	5255.62	T = 33
Credit_dd_ expect	overall	2.149125	0.2077125	1.58	2.65	N = 297
	between		0.1330684	1.914545	2.390909	n = 9
	within		0.1653832	1.518215	2.524276	T = 33

Table A2: Relating Sectoral Credit stock to Credit Demand Expectations

	lncredit	lngovsec	lgdp	rlendr~e	rdeprate	cbr	inf
lncredit	1.0000						
lngovsec	0.2282*	1.0000					
lgdp	0.7019*	0.1194	1.0000				
rlendrate	-0.0823	-0.3518*	-0.0470	1.0000			
rdeprate	0.0012	0.0332	-0.0012	0.9079*	1.0000		
cbr	-0.1022	-0.4948*	-0.0544	0.3563*	0.1777*	1.0000	
infl	0.0032	-0.0128	0.0040	-0.9174*	-0.9948*	-0.1247	1.000
tbill	-0.1175	-0.6050*	-0.0693	0.2561*	0.0235	0.7889*	0.004
profit_roa	-0.2131*	-0.9157*	-0.1109	0.2713*	-0.1052	0.3348*	0.078
liq_ratio	0.0234	0.3782*	0.0458	0.0140	0.1984*	-0.2468*	-0.204
npls_ratio	0.1986*	0.9553*	0.1149	-0.3281*	0.0580	-0.3844*	-0.022
lassets	0.2393*	0.9689*	0.1173	-0.3374*	0.0255	-0.5165*	-0.015
lnse	-0.1414	-0.7294*	-0.0898	0.1378	-0.1534*	0.0067	0.115
credit_dd_~t	0.4515*	-0.1408	0.3399*	0.0240	-0.0437	-0.1488	0.019

	tbill	profit~a	liq_ra~o	npls_r~o	lassets	lnse	credit~
tbill	1.0000						
profit_roa	0.4601*	1.0000					
liq_ratio	-0.3171*	-0.3675*	1.0000				
npls_ratio	-0.5620*	-0.8750*	0.4708*	1.0000			
lassets	-0.5716*	-0.8969*	0.3279*	0.8723*	1.0000		
lnse	0.2371*	0.7346*	-0.5413*	-0.8316*	-0.6578*	1.0000	

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