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DETERMINANT OF NON-PERFORMING LOAN IN DEVELOPMENT BANK OF ETHIOPIA

DETERMINANTE DE PRÉSTAMO VIGENTE EN BANCO DE FOMENTO DE ETIOPÍA

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Abstract: This study aimed at examining the determinant of non-performing loans in the development bank of Ethiopia. Other objectives included determining bank-specific and macroeconomic factors for default loan performance. Based on Development Bank of Ethiopia (DBE) reports from 1990-2019 there was an increase in NPLs during the studied period. Due to this, the performance of the bank is highly affected and the bank leads to insolvency. The thesis aimed to determine determinants of non-performing loans in DBE by determining theoretical and empirical evidence that help answer the research objective. The study used an explanatory design and a mixed research approach. The primary data by interviewing the staff of DBE those who were senior credit officers and team managers. And the secondary data was obtained from the bank's annual financial performance report and the National Bank's annual report for thirty consecutive fiscal periods from 1990 up to 2019. This study used an autoregressive distributed lag (ARDL) model or Bound Testing approach to co-integration. Non-performing loan ratio was taken as the dependent variable while Return on asset (earning capacity), liquidity, capital adequacy, bank size, exchange rate, lending rate (interest rate), inflation, and GDP have been taken as independent variables. The study found that there was a significant negative relationship between earning ability (ROA), Interest rate, Gross domestic products, inflation rate, and nonperforming loans of development banks of Ethiopia. The relationship between bank size and liquidity with non-performing loans was found to be positive. In addition to bank-specific factors and macroeconomic variables related to variables such Bank lends by the project itself as collateral with small lending rate relatively other commercial banks of the country, a long delay on implantation, poor known your customer assessment, political and social instability, inadequate coordination among stakeholder, governance, and structure, excessive external intervention The implications of the study suggest that Development Bank of Ethiopia should modified business model, bank credit policy-related issue such as appropriateness, timelines risk management and alignment with the current political macroeconomic realities, the bank should regulating interference of government bodies on loan approval, processes, and implementation, the bank should reduce project delays.

Keywords: Non-Performing Loans, Development bank of Ethiopia, Determinant of NPL.

Resumen: Este estudio tiene como objetivo examinar el determinante de los préstamos en mora en el banco de desarrollo de Etiopía. Otros objetivos incluyeron determinar los factores macroeconómicos y específicos de cada banco para determinar el desempeño de los préstamos en mora. Según los informes de Banco de Desarrollo de Etiopía (DBE) de 1990-2019, hubo un aumento en los préstamos dudosos entre el período estudiado. Debido a esto, el desempeño del banco se ve muy afectado y el banco conduce a la insolvencia. La tesis tiene como objetivo establecer los determinantes de la cartera vencida en DBE mediante la determinación de evidencias teóricas y empíricas que ayuden a responder al objetivo de la investigación. El estudio utilizó un diseño explicativo y un enfoque de investigación mixto. Los datos primarios al entrevistar al personal de DBE aquellos que eran oficiales de crédito senior y gerentes de equipo. Y los datos secundarios se obtuvieron del informe anual de desempeño financiero del banco y del informe anual del Banco Nacional de treinta períodos fiscales consecutivos desde 1990 hasta 2019. Este estudio utilizó un modelo de retardo distribuido autorregresivo (ARDL) o un enfoque de prueba limitada para la cointegración. La tasa de morosidad se tomó como variable dependiente, mientras que el rendimiento del activo (capacidad de ganancia), la liquidez, la adecuación del capital, el tamaño del banco, el tipo de cambio, la tasa de interés activa (tasa de interés), la inflación y el PIB se tomaron como variables independientes. El estudio descubrió que había una relación negativa significativa entre la capacidad de generar ingresos (ROA), la tasa de interés, el producto interno bruto, la tasa de inflación y los préstamos en mora de los bancos de desarrollo de Etiopía. La relación entre el tamaño del banco y la liquidez con los préstamos en mora resultó positiva. Además de los factores específicos del banco y las variables macroeconómicas relacionadas con variables como los préstamos del Banco por el propio proyecto como garantía con una tasa de interés pequeña en relación con otros bancos comerciales del país, un retraso prolongado en la implantación, mala valoración de su cliente, política y social. inestabilidad, coordinación inadecuada entre las partes interesadas, gobernanza y estructura, intervención externa excesiva Las implicaciones del estudio sugieren que el Banco de Desarrollo de Etiopía debería modificar el modelo de negocio, cuestiones relacionadas con la política de crédito bancario como la idoneidad, los plazos, la gestión de riesgos y la alineación con la política actual realidades macroeconómicas, el banco debería regular la interferencia de los organismos gubernamentales en la aprobación, los procesos y la implementación de los préstamos, el banco debería reducir las demoras en los proyectos.

Palabras clave: préstamos en mora, banco de desarrollo de Etiopía, determinante de la morosidad.

INTRODUCTION

The Development Bank of Ethiopia (DBE) is one of the two state-owned banks in the country. As a development bank, it is entrusted with the objectives of medium and long-term financing of development projects in agriculture and industry. A key provider of development finance and has been an important stimulant in accelerating the country's economic growth. The Bank is entrusted with providing development finance to projects from the priority sectors of the government that encompasses commercial agriculture, agro-processing industries, manufacturing, mining and extractive industries. In the last three decades, the bank's balance sheet has expanded dramatically as its annual loan disbursement to development projects has grown both in volume and number. On the other hand, the quality of its assets, measured by the non-performing loans ratio, has continued to deteriorate fast, posing significant challenges to its very survival. A non-performing loan is any loan in which interest and principal payments are more than 90 days overdue; or more than 90 days' worth of interest has been refinanced. It is also the sum of borrowed money upon which the debtor has not made the scheduled payment for the specified period. Zero payment of interest and principles Aug2019.

Hence, non-performing loan (NPL) projections are a crucial part of macro-stress tests for banks. These tests are based on macro-economic assumptions in order to provide common scenarios for all financial institutions participating in such an implementation. However, due to limited data availability, short time series and structural breaks, especially in emerging markets, it is challenging to estimate a robust model for any single country. It is therefore useful to provide an estimate based on panel data from emerging Europe to be used as a benchmark for countries in this region (European Insurance and Occupational Pensions Authority (EIOPA), 2018).

Many research studies empirically confirm that credit quality is tightly linked to the economic cycle. However, there is some disagreement as to the importance of other factors driving credit quality (Beck et al., 2013). The causes for loan default vary in different countries and have a multidimensional aspect both, in developing and developed nations. Theoretically, there are so many reasons why loans fail to perform. Some of these include depressed economic conditions, high real interest rates, inflation, indulgent terms of credit, credit orientation, high credit growth and risk appetite, and poor monitoring. NPLs can arise from factors specific to the bank or macroeconomic conditions (Emmanuel, 2014).

Accordingly, NPL financial stability in Central, Eastern and Southeastern Europe (CESEE), where banks apply the traditional business model based on accepting deposits and granting loans. Although the recent financial crisis had its origin in advanced economies, average bank asset quality in CESEE deteriorated sharply when the subsequent economic crisis hit the global economy.

Despite the heavy regulation and ongoing efforts made to control the banking industry in general and the lending activities in particular, the non-performing loan problems are still a worldwide headache and a major concern for both international and local regulators (Boudriga,2009). In Ethiopia, the banking environment has undergone many regulatory and financial reforms like in

other African countries with the aim of improving profitability, efficiency and productivity (Lelissa, 2007).

In the process of providing credit assistance to the investment activities and Determinants of Non-Performing Loans in Banks for projects in the economy in sub-Saharan African hits, the financial institutions face inherent risks in the form of default risk which results in a build-up of Non-Performing Loans (NPLs) that have a negative effect on the profitability of the financial institution's word bank (2016).

Statement of problem

Development Bank of Ethiopia is one of the public investment banks in Ethiopia that deliver mainly medium (3-5 years) and long term (5-20 years) investment credit to borrowers in different sectors. Financing long term credit has high credit risk which in turn exposes to high NPLs, (NBE, 2010). According to the loan portfolio report of the Bank as of November 30, 2018, The Development Bank of Ethiopia (DBE) is one of the two state-owned banks entrusted with the objectives of medium and long-term financing of development projects in the agricultural, Agro processing, Manufacturing industry, mining and extractive industry sectors. Over the past 10 years, the Bank disbursed over Birr 48.8 billion to different development projects. Just in 2017/18 alone, it disbursed Birr 7 billion. However, recently, different examinations reports, including supervision reports of the NBE, indicate that almost all prudential and financial indicators of the Bank have continuously deteriorated pushing it to near insolvency.

On September 28/2018 Development Bank of Ethiopia said its Non-Performing Loan (NPL) ratio has intensified to 40 percent which is from 9.9 percent in 2013/14. It is becoming very clear now that at this juncture the surge in NPLs has become an immediate destabilizing factor for the recovery of the economy present as opposed to the NBE 2008, standard development bank maximum limit of NPL is 15 %. The project failure is attributed to whatever source, it will increase the sunk cost of the country fixed investments of the projects are specific to the intended purpose and difficult to liquidate or require high switching costs. Moreover, it reduces the fund available for loans that the Bank could finance other projects that may have significant importance for the economic growth of the country which is needed to investigating the effect of bank specific and macroeconomic factors on the non-performing loans of a development bank.

The gap; there are researchers Adamu Legese; 2013 Mitku Malede; 2014, Ashenafie: 2015, Mamuye A. 2015; Simion, 2018 and conducted on determinates of the nonperforming loan of development bank of Ethiopia those researchers used only none empirical data. They assess only no empirical type of data; various focusing bank policy induced variables, Project follow up attributes, commodity specific nature, and source of equity contribution and credit evaluation criteria factors that might cause the occurrence of default in project finance from the credit expert's viewpoint.

Accordingly, as per the knowledge of the researcher, development bank Ethiopia is a highly financially distressed bank and a longer aged bank since 1913; it need evaluate using empirical data on the macro-economic determinants

of NPLs. Consequently, the study aims to analyze the determinants of macroeconomic and microeconomic factors of non-performing loans in DBE; for that matter, the researcher formulated micro and macro-economic variables:

RESEARCH QUESTION

To provide answers to the research objectives that are described above the following research questions were forwarded:

I. What are the internal determinants of NPL, in the case development Bank of Ethiopia?

II. What are the Macroeconomic determinants of non-performing in the case of development bank Ethiopia?

Objectives of the study

General objective of study

The overall objective of this the study was to examine the determinants of non-performing loan (NPLs) in Development Bank in Ethiopia.

Specific objective

I. To identifies the internal (micro) determinants NPL of development bank of Ethiopia

II. To identifies Macroeconomic determinants of NPL of development bank of Ethiopia

Research Hypothesis

Up to the knowledge of the researcher, there is no separate study conducted in the development bank of Ethiopia in relation to NPL and bank profitability using empirical and qualitative data. In line with the above definition and its broad purpose statement, the following hypotheses were also formulated for investigation. Null Hypothesis:

Hμ: There is negative relationship between return on asset and NPLs.

Hμ: There is negative relationship between liquidity level and NPLs

Hμ: There is positive relationship between capital adequacy ratio and NPLs.

Hμ: There is negative relationship between bank size and NPLs

Hμ: There is a positive relationship between GDP rate and NPLs.

Hμ: There is negative relationship between inflation rate and NPLs.

Hμ: There is positive relationship between exchange rate and NPLs.

Hμ: There is positive relationship between Lending rate and NPLs

Scope and Limitation of the Study

The study delimited to analyze the determinants factor of non-performing loans in the development bank of Ethiopia. The study covers the assessment and identification of macroeconomics variables that have a significant impact on the capabilities and performance of loans, the paper is limited to bank specific factors.

Thus the study discovered micro level bank specific factors that determine the bad loans ratio in DBE. The study was also limited to bank employees and the financial performance of banks. The study was undertaken in the head office and Addis Ababa branch; this is because the researcher experienced that majority of credit is given at head office level project financing those supplementary than 25 million birr under the especial control main branch.

Getting actual and well audited data in the very beginning might be limited study data quality and further' emancipating time, the NPL report might be unwilling to give a response back actual and tangible information due to confidentiality for bank classified operational information of the bank. However, to cover-up up this limitations gap: research would able to respondent indirectly, being friendly and by ethically way manipulating their intentions about NPL and thirty years' data will be overbidding from different outsourcing data from IMF, NBE, DBE and world bank table report available online to be able to reliable and minimizing stationeries of data.

LITERATURE REVIEW

Theoretical review of non-performing loans

Development bank of Ethiopia attempts to invest as much of the available funds as possible, in the form of loans and credit facilities so as to maximize the profit. This in turn results in the majority of bank assets being in the form of loans and credit facilities (DBE, 2019). Despite the loan portfolio is typically the largest asset and the predominant source of revenue for banks, the function of granting credit is not free of risks (Casu et al. 2006). In practice, loans are considered as the types of investment that have the highest levels of risk with regard to the difficulty of the funds' recovery. DBE is exposed to numerous difficulties regarding the protection and recovery of funds granted in the form of loans and credit facilities. As noted in Heffernan (2005) the failure of the development banks' clients to repay their obligations caused the emergence of NPLs and is considered the most serious financial problem facing the bank. Hence, the following sections discussed the meaning, classification and determinants of NPLs in detail.

Non-performing loans

The phenomenon of NPLs is experienced by state owned and private banks over the world. But this issue is more critical in development banks, especially in developing countries. Due to the sours of funds, mandates and policies of development banks are unique from commercial banks.

A nonperforming loan (NPL) is defined as a sum of borrowed money upon which the debtor has not made his or her scheduled payments for at least 90 days. The loan is nonperforming when payments of interest and/or principal are past due by 90 days or more, have been capitalized, refinanced, or delayed (IMF, 2005) Besides, the Ethiopian banking regulation also defines NPL as follows: "Nonperforming loan and advances are a loan whose credit quality has deteriorated and the full collection of principal and/or interest as per the

contractual repayment terms of the loan and advances are in question" (NBE, 2008). A nonperforming loan is either in default or close to being in default. Once a loan is nonperforming, the odds that it will be repaid in full are considered to be substantially lower. If the debtor starts making payments again on a nonperforming loan.

Empirical studies on determinant of no performing loans

Empirical Studies in Ethiopia

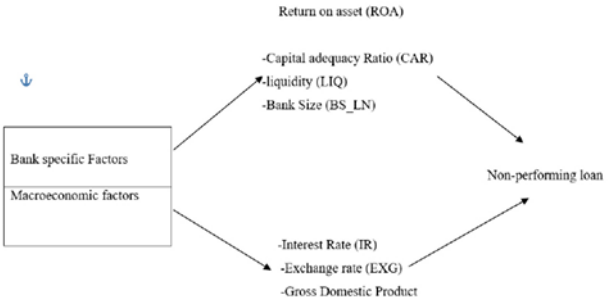
Most literature that is examined in this study used banks specific and macroeconomic factors as a determinant of banks NPLs. Empirical evidence included in this study is determinants of banks Non Performing Loan: an empirical study on Ethiopian commercial banks by (Wondimagegnehu, 2012), Determinants of Non-Performing Loans; The case of Ethiopian Banks: an empirical review of Ethiopian commercial banks by (Gadise, 2014), Determinants of Non-Performing Loans: an empirical study in case of Ethiopian Banks.

Wondimagegnehu (2012) examined the determinants of Ethiopian commercial banks NPLs. The study used a self-administered questionnaires sample size of 150 respondents and financial information collected from NBE, and annual reports of the banks (from the year 2005 to 2010). The researcher carried out with SPSS ver. 16. And descriptive statistics were employed to analyze data. Analyzing the response, he indicates that fund diversion was thought to cause occurrences in all the banks surveyed while compromised integrity and over/under financing were the factors for the occurrence of NPLs.The study also mentioned that poor credit assessment attributed to capacity limitation of credit operators, institutional capacity drawbacks and unavailability of national data for project financing had also led to setting terms and conditions that were not practical and/or not properly discussed with borrowers had been the cause for occurrences of loan default. Credit monitoring/ follow-up, underdevelopment of credit orientation /culture borrowers engaged in business that they had no depth knowledge, unfair competition among the banks along with the aggressive lending pursued added to the poor customer selection made in a motive to maximize profit by the banks and/ or due to the moral hazard or compromised integrity over financing due to poor credit assessment and underdevelopment of supervisory authority competence in formulating policies, monitoring capability plays a pivotal role to ensure loan collection failure.

Gadise (2014) studied the determinants of Ethiopian commercial banks NPLs. this study utilized both descriptive and econometric analysis based on panel data from 2002-2013 and 96 observations were analyzed to examine the determinants of NPLs of Commercial banks in Ethiopia. The data was processed and analyzed through STATA version 12 software packages.

Conceptual Frame Work

The main objective of this study was to examine the determinants of nonperforming loan (NPLs) of development bank. Based on the objective of the study, the following conceptual model is framed. As it described previously in the related literature review parts, bank profitability can be affected by bank specific, industry specific or macroeconomic factors. Bank specific factors are: non-performing loans overt, earning ability, liquidity, bank size, and Loan growth In addition to this there are also macroeconomic factors which can affect bank profitability such as economic growth which is measured by exchange rate, lending rate, GDP and inflation. Thus, the following conceptual model is framed to summarize the main focus and scope of this study in terms of variables included.



RESEARCH DESIGN AND METHODOLOGY

Research design

Research design is the "blue print" of the study. The design of a study will define the study type (descriptive, correlation, semi-experimental, experimental, review, meta-analytic) and subtype (e.g., descriptive-longitudinal case study), research question, hypotheses, independent and dependent variables, experimental design, and, if applicable, data collection methods and a statistical analysis plan. Research design is the framework that has been created to seek answers to research questions.

Many research designs would be used to study business problems (Hair et al., 2011). Depending on the way in which researchers ask their research questions and present their purpose, the research design will be classified into three groups, namely exploratory, descriptive and explanatory studies (Saunders et al., 2009, p. 138 & 139).

Nature of Data and Instruments of Data collection

This study used panel data. The researcher prefers to use panel data since panel data can take heterogeneity among different units into account over time by allowing for individual-specific variables. Besides, by combining time series and cross-section observations, it gives more informative data. Furthermore, panel

data can better detect and measure effects that simply cannot be observed in pure cross-section or pure time series data (Gujarati, 2004).

The main source of data for the study is obtained from the balance sheet and income statement of development bank of Ethiopia. From the bank, 30 consecutive years' (i.e from 1990-2019) balance sheet and income statement reports have been used for the study. In Ethiopia it's a must for banks to report and submit their annual report to the controlling body in this case NBE. As a result it makes life easy for the researcher to get annual reports of all selected banks from the NBE central data base and the financial statements from the annual audited report of NBE. NPL from balance sheet, income statements and annually performance report development banks are used for this research and to run the model. The main reasons to take only development bank of Ethiopia which stayed for long period in the banking industry. However development bank of Ethiopia has high insolvency or liquidity problem especially related to defaulting loan which high disclosed for to public electrons (ministry midi) press published exclude those banks who start operation in the industry have not that much credit risk than development bank. In addition taking more than thirty years data will show the trained and unusual occurrences in the industry.

Sample Design

The "best" sample design depends on survey objectives and on survey resources. For example, a researcher might select the most economical design that provides a desired level of precision. Or, if the budget is limited, a researcher might choose the design that provides the greatest precision without going over budget. The researcher believed that the sample size is sufficient to make sound conclusion about the population. The samples were selected using non-probability purposive sampling from development bank head office and branches for data from 1990 to 2019.

Data and Data Collection Instruments

Both primary and secondary data was used in this research study. Primary data were collected from the selected sample population by using structured and open ended subjective interview and secondary data was collected from audited financial statements (balance sheet and income statement) of DBE included in the sample and various directives of DBE and publications of NBE for the macroeconomic data from 1990 to 2019. All data was being collected on annual base.

The data would use to assess and identify major bank specific factors of nonperforming loans in DBE which are related to the quality, efficiency, effectiveness, regularity and etc of loan administration operations of the Bank's loaning units and non-bank specific (borrowers related and external) factors of NPLs in DBE.

Applying appropriate data gathering instruments help researchers to combine the strengths and amend some of the inadequacies of any source of data to minimize risk of irrelevant conclusion. Consistent and reliable research indicates

that research conducted by using appropriate data collection instruments increase the credibility and value of research findings (Koul 2006).

Data Gathering Tools and Sources of Data

The researchers were used financial data for the last thirty years from1990 to 2019 secondary source mainly from annual reports development bank. The secondary data gathered was focused mainly on components of income statement and balance sheet i.e. capital, asset, liability, income and expenditure section of each banks have taken as a sample. In addition to banks data it was used macroeconomic data by focusing on real GDP, exchange rate, lending rate and inflation.

The sources of data of this study was from NBE research and bank supervision directorates, credit management departments of the development bank .Moreover to accomplish the objectives of this study, the researcher collected data from secondary sources annual reports of the development bank and directives issued by the National Bank of Ethiopia was used.

Method of Data Analysis

First, this study collects the needed data from the sources mentioned earlier. After that, collected data are rearranged, edited and calculated in order to become complete data that is needed for this study. Next, these collected data are analyzed by using E-views 9.

Study Variables

Non-performing loan is dependent variables used in this study. It is measured in terms of NPLR. Besides, explanatory variables included in this study are ROA, Bank size, Capital Adequacy, liquidity are those from the bank specific factors, Interest rate and exchange rate from industry specific and GDP with inflation from the macroeconomic factors.

$$\text{NPLR} = \frac{\text{Total nonperforming loan}}{\text{Total outstanding loan}} \times 10$$

this is only the dependent variables

Model Specification

In the present study econometrics model was used. Econometrics model may be defined as the quantitative model which analysis of actual economic phenomena based on the concurrent development of theory and observation, related by appropriate methods of inference (Gujarati, 2004), the following general multivariate regression equations were adopted:

$$Y_{i,t} = \alpha + \beta X_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where Yi,t is the NPLs ratio of bank i at time t, with i=1... N, t=1... T, α is a constant term, Xi,t is the independent variables(bank specific and macroeconomic variables) of bank i at time t and εi,t the disturbance term.

Econometric model will use because it provides us numerical measure of the relationship between the dependent (Non-Performing loans) and independents variables (GDP, Exchange rate, lending rate and inflation rate, bank size, earning ability, loan growth and liquidity level); hence it was shown that how NPL affect banks performance. So to investigate the bank-specific and macroeconomic determinants of bank NPLs the following detail regression equation was used.

NPL=β0+β1INFL+β2GDP+β3EXG+β4LR+β5CAR+β6BS+β7CAR+ +β8LIQ+# (2)

Where: βo is an intercept

β1, β2, β3, β4, β5, β6, β7 and β8 represent estimated coefficient for specific bank i at time t

Data Analysis and Discussion of Result

Descriptive statistics of the data

The descriptive statistics for the dependent and independent variables are presented below. The dependent variable is non-performing loan measured by npr and others are the independent variables they are: return on asset (earning ability), Capital Adequacy, Bank Size, Interest spread (landing rate), real GDP growth and Inflation. In order to give a brief overview of our data, we present the following Table 4.1 which contains the descriptive statistics of our variables of development bank of Ethiopia from 1990 to 2019. From the histogram of all the variables, we assume that all the variables follow a normal distribution.

Table 4.1
Descriptive Statistics

	NPLR	ROA	LR	INF	LIQ	GDP	EXG	CAR	BS
Mean	0.25772	0.007257	11.80683	10.80699	1.158678	0.147179	12.22449	0.12337	6.798379
Median	0.285 ¬	0.006924	11.88	7.932914	1.171949	0.093211	8.6664	0.146714	6.705799
Maximum	0.42	0.020064	15.5	55.24131	1.517291	1.113833	31.7832	0.340931	7.897273
Minimum	0.09	-0.0096	6.8	-10.7734	0.84047	-0.03014	2.07	-0.18981	5.309315
Std. Dev.	0.10311	0.007087	2.190096	14.23926	0.150552	0.281018	7.853452	0.114812	0.640548
Observations	30	30	30	30	30	30	30	30	30

The Researcher computation through Eviews 9

NPL measured by total NPL divided by Total outstanding loan ranges from 9%- 42 %. It has a mean value of 25.7% showing relatively the highest deviation of 10.31% from its mean value. Of 15% (National Bank of Ethiopia, 2008.aforementioned statistics of NPLs development banks# loan failure is a gigantic problem. Agborade 2002 described that banks only pass 25% in getting into the zone of weak credit risk control system, the industry in general not reaching to that stage. The standard deviation of 10.31% also indicates that there is high variation among banks credit risk exposures.

ROA measured by Net income divided by Total asset ranges from 0.6%- 2 %. It has a mean value of -0.9 % showing relatively the lowest deviation of 0.6 % from its mean value.

This indicates that development in Ethiopia earn 0.6% return on averages from the asset per year. According to Richard (2015), Return on equity between 15% and 20% are considered desirable, the average industry mean value of 0.6 % return on asset tells that the banking industry is the area where it makes loss. Nevertheless, literature of Navapan and Tripe (2003) doubts that getting this much return on asset may not always send a good message, but it may also result from having a small, inefficient and less competitive market.

CAR also measured by total equity divided by total assets having a minimum of 14% and maximum of 34% with a mean value and standard deviation of 12.33% and 11.48% respectively. This indicates that CAR for development banks of Ethiopia during study period was above the minimum requirement, which is 8%.

Bank Size (BS) measured by log of asset of total asset of a fiscal period a mean value 67.98 with the standard deviation of 64%. The maximum and minimum values were 78.97% and 53.09% respectively. The standard division indicated in Table 4.1 with a value of 64% is the maximum from all other variables. This implies that there is a huge difference between the biggest bank and the small bank. Gibson (2001) proposes that the effect of a growing bank's size on profitability may be positive up to a certain limit. Therefore those banks which have a big size have an advantage of fascinating some credit risks especially non-performing loan.

Liquidity is the last bank specific explanatory variables is measured by liquid asset to total asset and tells us the maximum and minimum values ranged from 15% to 11.17%. The mean value of liquidity of development of bank Ethiopia shown as 11.58% percent and standard deviation of 15.05%. The study indicated that liquidity of bank was decreased for the last thirty years due to increase of credit facilities and for intended it may happen liquidity risk.

The other independent variables are macroeconomic indicators that can affect banks nonperforming loan over time. The mean value of inflation was 10.80% and standard deviation of 14.23% the inflation rate of the country over the past thirty fiscal years was increased from 55.57% to -10.55%. This implies that due to non-moderate inflation rate it arise unsound economy and it is challenged to enhance the economic growth by mobilizing the resource of the country (NBE,2009).Economic policy of a country could not keep the price of different products as a result inflation rate is increased for the ten consecutive year especially from Ethiopian millennium due this purchasing power of money highly decline

Exchange rate shown that maximum and minimum value revealed 31.78 and 2.07 respectively and mean value of 12.22 standard deviation was 7.78. This implies that the foreign exchange rate in Ethiopia during the study period remains highly unsound. Since the country's currency highly devaluated and during the period the banks client especially importers are highly disputed .the importer stay by pofoma invoice long time to approved foreign currency by NBE and failed to repay the required bank loan repayments on due date.

Interest rate (lending rate). The mean value of lending rate was 11.8 and this is the lowest standard deviation of 2.19%. The lending rate of the country over

the past fourteen years was recorded from 15.5% to 5.5%.This highly stable lending rate implies that the banks profit increased and has a positive impact for the country's economic growth and borrowing ability relatively more than government and private bank which is high challenge for development bank of Ethiopia due to bank's business policy which bank financed mega project without collateral.

GDP was the last independent macro variable the mean value of GDP was 14.71%, standard deviation of 28% and the maximum and minimum value was tells us -3% and 11.11% respectively. This indicates that the economic growth during the previous thirty years remains sounded and the result of this stable economic growth could have impact for development bank Ethiopian and the country.

Multiple Regression Analysis

Regression Result for affecting Non Performing Loans
Dependent Variable: NPLR
Method: Least Squares
Date: 01/24/20 Time: 15:03
Sample: 1990 2019
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA	-0.6037	0.491204	-1.22901	0.00187
LR	-0.04136	0.013659	-3.02793	0.0064
LIQ	-0.26163	0.184444	-1.4185	0.00207
INF	-0.00043	0.001125	-0.37993	0.0078
GDP	0.137784	0.079306	1.737372	0.0027
EXG	0.016376	0.007579	2.160816	0.00424
CAR	0.886714	0.345987	2.562856	0.00181
BS	-0.23342	0.08699	-2.68329	0.0139
C	2.354649	0.722502	3.259019	0.0038

R-squared	0.591413	Mean dependent var	0.257723
Adjusted R-squared	0.435761	S.D. dependent var	0.103110
S.E. of regression	0.077452	Akaike info criterion	-2.034996
Sum squared resid	0.125974	Schwarz criterion	-1.614637
Log likelihood	39.52494	Hannan-Quinn criter.	-1.900520
F-statistic	3.799580	Durbin-Watson stat	1.207406
Prob(F-statistic)		0.006661	

Discussion of the Regression Result

Bank Specific Variables

Earning Ability

Earning ability (return on asset) is bank specific factors of the banks and the researcher measure it by net income over total asset of DBE. Before as per prospect mentioned on chapter three the regression result shown that it has significant and negative relationship with NPLs. Since earning ability has (P value=0.00187). The coefficient -0.6037 implies when earning ability is goes up by one unit non- performing loan is goes down by 0.6037 provided other independent variables are constant. This is due to a bank with moderate profitability has less incentive to generate income due to banks business model engage in risky accomplishments such as funding risky mega projects without collateral and within high provision fund are exposed to credits risk and subsequently achieve high levels of impaired loans.

The borrowing is predominantly sourced from the National Bank of Ethiopia, which accounts more than 92% of borrowings, which portends a potential asset-liability mismatch in the Bank's balance sheet. The regression result and the interviewees respond shows that banks profitability is in negative.

Bank size

The size of the banks increase it is less likely that they will fail and longer the survival time. Larger banks have the advantage of better access to additional financing, dealing with liquidity problems and diversifying risk.

Bank size is the internal factors of the study which is measured by natural log of total asset of the banks. According to the regression result bank size has negative association ship with nonperforming loan of Ethiopian commercial banks. Hence, it is observed that bank size has statistical significant on NPLs at 10% significance level (P value=0.0139). When bank size is goes up by one unit non- performing loan is goes down by 0.23342 provided other independent variables are constant. The size of the bank increase it is less likely that they will fail and longer the survival time.

Negative relationship between size and bad loans indicated that larger banks are more able to solve problems of information asymmetry in comparison to their smaller counterparts. With skilled employees and quality information bases, larger banks are more effective in credit analysis and monitoring their debtors. And also larger banks have the advantage of better access to additional financing, dealing with liquidity problems and diversifying risk. Larger banks have more resources and are more experienced in dealing better with bad borrowers.

Similarly, the primary data also supports the output of the regression analysis fully. That is as per the interviewees responds, Ethiopian banks NPLs decrease as the size of the banks increase ,which strengths the fact that larger banks are adequately monitor and effectively minimize NPL than smaller banks of the country.

This result agrees with the finding of Akhavein et al. 1997; Bourke 1989; Molyneux and Thornton 1992; Bikker and Hu 2002; Goddard et al. 2004. Have reported an inverse relationship due to the fact that big banks have large resources to evaluate their loans, which improve the quality of loans, and greater opportunities for portfolio diversification more than small banks

Liquidity

The other bank specific factor of nonperforming loan is liquidity. The researcher used to measure the overall liquidity current ratio method that is current asset by current liability of each fiscal year was used. The results of random effect model table 4.6 indicated that liquidity had a negative relationship with NPLs, and statistically significant (p-value = 0.00207) at 5% level. When liquidity is goes up by one unit non- performing loan is also goes down by 0.26163 provided other independent variables are constant. The coefficient of liquidity was -0.26163 this negative sign. it was consistent with null hypotheses random model .higher liquidity may imply the inefficient utilization of resources and loan service by the banks is decline and also not disburse additional loans to the prominent clients to strength the borrower's capacity. The banks interviewees also support such issue and they stated that loan facility is provided regarding with the 5c #(capacity, capital, collateral, character and condition.

Capital Adequacy Ratio (CAR)

Based on the findings in Table 4.5 the positive and statistically significant impact of capital adequacy on npl determines the risk explosion behavior of bank. This study identifies statistically significant and positive impact of capital adequacy ratio on NPL of bank. Thus, result is consistent with the hypothesis developed in this study. The study hypothesized that there is a positive association between CAR and NPL of banks (Goddard et al., 2004).

This positive sign indicates a positive relationship between capital adequacy ratio and NPL. Thus, it implies that for one unit change in the banks' capital adequacy ratio, keeping other thing constant had resulted 0.886714 unit increase or decrease on the levels of NPL in the same direction. This means that 0.886714 unit increase or decrease on CAR.

Industry Specific Factors

Interest Rate (lending rate)

Lending (interest) rate is charge from the borrower's reimbursement for the loans based on contractual agreement the minimal rate standardized by NBE which govern the overall banking industry of the country. Lending rate has negative connotation with nonperforming loan of banks as per the expectation. Hence, it is observed that lending rate has statistical significant on NPLs at 10% significance level (P-value=0.0064). When lending rate is goes up by one unit

non- performing loan is also goes down by 0.04136 provided other independent variables are constant.

Increase of interest rate produces additional debt burden for the brewer but income for lender bank especially for development bank. It is entrusted with the objectives of medium and long-term financing of development projects in agriculture and industry .interest income lion portion for the bank's level. The Bank takes considerably higher credit risk than conventional commercial banks in financing development and start-ups projects. The interest rates and fees it charges on its customers are substantially below market. This has made, the task of balancing the act of high risk taking with the objective of ensuring its financial sustainability is one of the critical challenges of the Bank.

Moreover, high lending rate reflects low r risk premium that banks charge for low credit quality debtors, indicating poor credit portfolios (Curak, 2013). Hence, This is the largest magnitude changes among paper are explained contributing variables against with non-performing loan. This indicates that, the average lending rate of development had a very strong impact in explaining the variation of NPLs. Thus, the increase in the real interest rate makes additional burden for debtors with variable rate loan contract at the same time minimize lazy borrowers they have not risk appetite .

Macroeconomic factors

Gross Domestic Product

GDP is the macroeconomic variables which measured by Real GDP growth in %.As per the above developed empirical model regression output. In this study real GDP has highly statistical significant and positive impact on NPLs at 5% significance level (P-value=0.0027). GDP is goes up by one unit non-performing loan is goes up by 0.137784 provided other independent variables are constant. The coefficient signs of real GDP growth rate show that, economic growth has a positive impact on the NPL of the banks. Expectedly the current econometric analysis suggest that real GDP growth is the main driver of nonperforming loan ratio in Ethiopia banking industry. The Encouraged Ethiopian economy over the study period creates the increment of the income which ultimately enhances the loan payment capacity of the borrower. Like with the empirical evidence, the result obtained from primary data also justified a positively and highly significant impact of Ethiopia real GDP growth on banks NPLs. However economic growth is increase request loan of individual, small and medium enterprises (SME) and mega project proposed by government for the society that financed by development bank of Ethiopia for mandates of the bank's the number This is because; the current Ethiopian economy growth could create a new and potential demand for the financial market and it might increase the probability of default loan.

There are significant empirical evidence of positive association between growth domestic product and non-performing loans (Fernandez, Martinez , and Saurina 2000).

Exchange Rate

Among the external determinants Exchange rate is the main factor for non-performing loans in Bank's. As a result exchange rate is average annual exchange rate in %. According to the regression result the exchange rate (EXG) has positive association ship with non-performing loans of the development banks of Ethiopia. Hence, it is observed that exchange rate has statistical significant and negative impact on NPLs at 5% significance level (P-value=0.00424). When exchange rate is goes up by one unit non- performing loan also goes up by 0.016376 provided other independent variables are constant. This implies that on average exporters and importer are highly user's foreign currency of country for credit facilities. Hence the value of Ethiopian birr depreciated in terms of euro, dollar and other Foreign exchange is not a resource just for generation of profit for DBE. Rather it has a far-reaching impact on the overall performance of the Bank as most of the Bank's financings (for Projects & SMEs) and loan collections are extremely dependent on availability of foreign exchange reign currency it can increase the competitiveness export-oriented Ethiopian firms in the international market. Foreign exchange crippled many import dependent manufactures. Such companies are operating significantly below their production capacity because of lack of raw materials and thus many of them failed to repay their loans as they become financially weak.

Inflation

The third and last macroeconomic variable is inflation rate which measured by Annual average inflation rate. As per the regression result it is observed that real inflation has statistically significant and negative impact on NPLs at 10% significance level (P-value=0.0078). Inflation is goes up by one unit nonperforming loan is goes down by 0.0043 provided other independent variables are constant. The coefficient signs show that, inflation rate has a negative impact on the NPLs of banks. Expectedly the current model result suggest that inflation is the main impact of nonperforming loan ratio in Ethiopia banking industry. This implies that Non-performing loans are alerted to changes in inflation. This means there is a reduction of NPLs if the inflation is high in the actual period. Since Inflation reduces the real value of debt and hence makes debt servicing easier. A probably interpretation of these results is that inflation leads to more profitability as more money look for few goods and services. In other case, most borrowers are business people who seem to pass over the cost of inflation to consumers. Thus business people retain their ability to repay their loans .In fact the finding support the previous study conducted by Warue,(2013), Chang, (2002), Shingjergji,(2013) and Guy and Lowe (n.d)) found that inflation creates a substantial negative association ship with nonperforming loans.

CONCLUSION AND RECOMMENDATION

So far the former chapter presented descriptive analysis and examined the result of the regression of all independent variables against the theories and

the researcher expectations. Besides, the results of findings and discussion were also made with the trained analysis of the present study had intended to determine the relationship between macro-economic and non-performing loans in Ethiopia, and to establish the relationship between bank specific factors and non-performing loans in Ethiopia. This chapter also indicates the intended directions to study for the next researchers.

Summary

Increasing non-performing loans indicated great danger in any economy as demonstrated in the financial crisis that spread throughout the whole world from. Development bank of Ethiopia NPL was ranged from 0.09 % to 42.% the minimum and maximum value respectively and It has a mean of 25.77%. The goal of this paper is to identify those factors that are responsible for non-performing loans in development Banks. Responsiveness of such factors will help in the formulation of policies to address the problem of NPLs. The utilized data are financial report of the bank from 1990-2019 and by interview questions with bank senior credit officers, credit approval team leaders, credit habitation team managers. Data on non-performing loans from total non-performing loan ,outstanding loan, capital adequacy ratio, bank size, earning ability and liquidity development bank of Ethiopia and other data those related with macro variables gross domestic product, exchange rate, interest rate, were sourced from National Bank of Ethiopia (NBE) .Based on the regression result this paper is good fitted. Since all variables are statistically significant at 90% confidence (leading rate or interest rate and inflation), at 95% confidence level (exchange rate, lending rate, gross domestic product, liquidity and capital adequacy ratio).

The R2 value resulted as 59.14% of fitness can be observed in the sample regression line. Furthermore, it measures 60.50 percent of the total variation in the non performing Ratio, is explained by independent variables (capital adequacy ratio bank size , liquidity and return on asset Real gross domestic product, inflation rate, exchange rate, average interest rate) jointly. Therefore, these eight variables explain 60.50% affected non-performing loans and the remaining 40.86% was affected by other determinants which were not included on this paper.

From the finding on the adjusted R squared, the study found that variation of 57.20% on the non-performing loan of the bank's due to changes in inflation, gross domestic product, Exchange rate, Average interest rate, capital adequacy ratio, bank size earning ability, liquidity. The study also revealed that there was strongly positive relationship between nonperforming and Exchange rate , capital adequacy ratio gross domestic product and negative association ship with return on asset, bank size, liquidity, bank size, lending interest rate and inflation from the classical model regression statistics result.

According to an interviewee with development bank of Ethiopia senior credit officers, credit approval team leaders, credit habitation team managers, the factors that can determine the non-performing of the bank were; the country's GDP, inflation rate ,exchange rate ,bank interest rate, bank size and capital adequacy ratio are their expected reasons to happen NPLs. In addition absence of knowing the borrower's reputation and the willingness (character), lack of

searching the ability to generate sufficient cash to repay the debt (return on asset), absence of recognizing level of investment in the business (capital), absence of predicting the circumstances that could affect the borrower's ability to repay the loan (conditions) and the type of securities taken to the bank to support the borrower's intention to repay the money advanced (collateral) were the major factors. As per the interviewees, borrowers fund diversion for unplanned purpose was a major determinate of NPLs on the bank. Borrowers who took a loan for a new investment purpose or for expanding his/her existing business may use the loan for other unproductive activates like buying luxury car in word project devastation. The others is that borrowers who obtained short term loans from banks may use the fund for capital expenditures that do not generate immediate income to repay their debt in accordance to the sated agreement. National policy related to priority area of project, bank business model that within small interest relatively other than other commercial bank in country and finding without any kind of collateral, and bank has no product specialization, dalliance to approve foreign currency indoor to importing row material and dalliance Ethiopian shipping lines borrows pay demerge cost ,tax system on central bank policy and government higher bodies interest factor for NPLs is inconsistence government regulation. Which mean National Bank of Ethiopia change directives frequently, especially providing loan facilities to export sectors?

Due to the absence of credit rating agency in the country, the loan repayment capacity of borrowers was measured by banks loan officers. As a result the inconsistence decision made by the staff may affect the loan quality of the banks.

Conclusion

The main objective of this study was to determine determinant factor of non-performing loan the development bank based on panel data analysis for the period from 1990 up 2019. The data was analyzed by using random effect model and used for the purpose of analysis, EView 9 software.

The study found Return on asset (earning ability) had negatively statistically significant relationship with NPLs of the banks. The result might indicate increase in earning in return on asset would lead to decrease nonperforming loans .This indications when banks reported remarkable income NPLs was goes down.

The study found a capital adequacy ratio has positive and statistically significant the result may indicate Npls of the bank. That increase their equity have a lower cost of capital and increase default loan. On the correspondingly banks that are relatively poorly capitalized were so conservative in extending loans and thus their profitability would be adversely affected. The result of having well-capitalized banks faces higher risks of going insolvent.

The negative and significant relation between liquidity and npl bank disclose that the more liquid a bank. , higher liquidity may also imply the inefficient utilization of resources therefore may be associated with a high probability of failure. A higher ratio of liquid assets to total assets implies a greater capacity to discharge liabilities, and is therefore associated with a higher survival time.

The study also found that bank size had negative association against with bad loans due to skilled employees and qualitative information bases, larger banks are more effective in credit analysis and monitoring their debtors. Some researcher also confirmed.

The result shows the coefficient of GDP was positive and statistically insignificant. There is no a direct relationship between GDP and bank default loan. However, the positive sign of the variable supports the argument that economic growth positively.

Regarding inflation the study also shows a positive relationship between inflation and banks default loan with statistically significant. Empirical studies suggest that if a bank's income rises more rapidly than its costs, inflation is attack repayment ability of borrowers on due date that increment other operational and admissive cost the payment for loan divert to cover those cost it lead to credit risk increased expected to exert a positive effect on profitability.

Exchange rate had also positive relationship with the DBE non-performing loans. A unit increase in exchange rate in the country would leads to decrease in nonperforming loans of commercial banks of Ethiopia by factor and this leads NPLs increase due to the government and the banks encouraged provide loan services more to export oriented firms.

Lending rate had negative association ship with non-performing loan development of Ethiopian a unit increase in Average lending rate would lead to increase in nonperforming loans of Bank.

Generally, all hypotheses of the bank specific variables were significantly impact on bank profitability. Therefore, the study concluded that most of bank profitability drivers are explained by bank specific determinants rather than external determinants.

Recommendations

Based on the findings of the study the following possible recommendations were forward:

The business model of the Bank related with its diversified credit products like agriculture financing, industry and SME financing should be reviewed. Some indicators and observers from outside of the Bank comment on the business model of the Bank and mention that the Bank's operations are too broad and it is functioning without proper specialization for specific sectors.

Bank to the credit policy related issues with regard to appropriateness, timeliness, risk management and alignment with the current political and macroeconomic realities. In this regard, the situational analysis conducted revealed that the Bank's credit policy needs a revision in some aspects. And commitment to effective implementation of policies.

Bank should regulating interference of government bodies on loan approval and processes

Implementation bank should reduce dalliance is also escalating investment costs of the projects sometimes more than twice the initial estimates thereby forced for provision of additional loans time and again for the projects to bring them to completion stage.

References

Abdeta, M. (2015). Determinants of nonperforming loan in Development Bank of Ethiopia (Doctoral dissertation, St. Mary's University).

Beck, T., De Jonghe, O., & Schepens, G. (2013). Bank competition and stability: Cross-country heterogeneity. Journal of financial Intermediation, 22(2), 218-244. https://doi.org/10.1016/j.jfi.2012.07.001

Boudriga, A., Boulila Taktak, N. and Jellouli, S. (2009), "Banking supervision and nonperforming loans: a cross - country analysis", Journal of Financial Economic Policy, Vol. 1 No. 4, pp. 286-318. https://doi.org/10.1108/17576380911050043

Filip, B. F. (2014). Non-performing loans-dimension of the non-quality of bank lending/loans and their specific connections. Theoretical and Applied Economics, 5(594), 127-146.

Casu, B. G. (2006). Introduction to Banking. Harlow Financial Times.

Chen, K., & Pan, C. (2012). An empirical study of credit risk efficiency of banking industry in Taiwan. Web Journal of Chinese Management Review, 15(1), 1-16.

Coyle. (2000). Frame work for credit risk management; Chartered Institution of Bankers,. United Kingdom.

Curak, M., Pepur, S., & Poposki, K. (2013). Determinants of non-performing loans–evidence from Southeastern European banking systems. Banks & bank systems, (8, Iss. 1), 45-53.

Dumitrescu, E. I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. Economic modelling, 29(4), 1450-1460.

Mishkin, Frederic S., Eakins, Stanley G. (2003). "Financial Markets and institutions" 4th edition.

Munyao, Emmanuel. (2014). Modeling Non-performing Loans in Kenya Commercial Banks. Kenya: Project of Science in Social Statistic, University of Nairobi.

Gujarati. (2004). Credit risk modeling and valuation: An introduce; Cornell University.

Gadise, G. (2014). "Determinants of Non-Performing Loans." Empirical in the Case of the Ethiopian Commercial Banks. Jimma University.

Hefferan, S. (2005). "Modern Banking#, Chichester, Wiley. Hu, J.-L. Y.-H. (2006). Ownership and Non-performing Loans.

Marijana Curak, S. P. (2013). "Determinants of non- performing.

Malede, M. (2014). Determinants of commercial banks lending: evidence from Ethiopian commercial banks. European Journal of Business and Management, 6(20), 109-117.

Moges, H. K., et al. (2013). A multi-dimensions analysis of data quality for credit risk management: new insights and challenges. Information & management, 50, pp.43-58. https://doi.org/10.1016/j.im.2012.10.001

NBE. (2008). Asset Classification and Provisioning Directive No. SBB/43/2008. National Bank of Ethiopia, Addis Ababa. Addis Ababa: National Bank of Ethiopia.

NBE. (2009). Annual report. Addis Ababa, Ethiopia: National Bank of Ethiopia.

NBE. (2015). Annual report. Addis Ababa, Ethiopia: National Bank of Ethiopia.

Nikolic, N., Zarkic-Joksimovic, N., Stojanovski, D., & Joksimovic, I. (2013). The application of brute force logistic regression to corporate credit scoring models:

Evidence from Serbian financial statements. Expert Systems with Applications, 40(15), 5932-5944. https://doi.org/10.1016/j.eswa.2013.05.022

Akinlo, O., & Emmanuel, M. (2014). Determinants of non-performing loans in Nigeria. Accounting & taxation, 6(2), 21-28.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. Journal of Applied Econometrics, 16(3), 289–326. http://www.jstor.org/stable/2678547

Pesaran, M. H. (1997). The role of economic theory in modelling the long run. The economic journal, 107(440), 178-191.

Podder, J., & Al Mamun, A. (2004). Loan loss provisioning system in Bangladesh banking: A critical analysis. Managerial Auditing Journal.

Roy, S. G. (2014). Determinants of non-performing assets in India-panel regression. Eurasian Journal of Economics and Finance, 2(3), 69-78.

Barr, R. S., Seiford, L. M., & Siems, T. F. (1994). Forecasting bank failure: A non-parametric frontier estimation approach. Recherches Économiques de Louvain/ Louvain Economic Review, 60(4), 417-429.

Shajari, P., & Shajari, H. (2012). Financial soundness indicators with emphasis on non-performing loans in Iran's banking system. Journal of Money and Economy, 6(3), 163-189.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. Econometrica: journal of the Econometric Society, 1551-1580.

Greenidge, K., & Grosvenor, T. (2010). FORECASTING NON-PERFORMING LOANS IN BARBADOS. Journal of Business, Finance & Economics in Emerging Economies, 5(1). 80-107

Khemraj, Tarron & Pasha, Sukrishnalall, 2009. "The determinants of non-performing loans: an econometric case study of Guyana," MPRA Paper 53128, University Library of Munich, Germany.

Võ, T. N. H., Lê Vĩnh, T., & Hồ, D. (2014). Macro determinants on non-performing loans and stress testing of Vietnamese commercial banks' credit risk. VNU Journal of Science: Economics and Business, 30(5E).

Mileris, R. (2014). Macroeconomic factors of non-performing loans in commercial banks. Ekonomika, 93(1), 22-39.

Wondimagegnehu. (2012). "Determinants of nonperforming loans" .The case of DBE.