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Determinants of Financial Distress Conditions of Commercial Banks in Ethiopia: A Case study of Selected Private Commercial Banks

Ephrem Gebreslassie
(MSc. in Accounting and Finance, lecturer)
Department of Accounting and Finance, College of Business and Economics, Wolaita Sodo University,
P.O.Box 471 Wolaita Sodo Ethiopia

Abstract
The study first assessed the financial health conditions of the selected private commercial banks using Altman Z-score model (ZETA Analysis) and estimated determinants of financial distress using panel data starting from 2002/03 to 2011/12 and six private commercial banks in Ethiopia using panel data regression, the researcher analyzed bank specific factors affecting firm's financial distress. In the study ZETA score of the banks is used as the proxy for financial distress. Finding of the study indicate that capital to loan ratio, net interest income to total revenue ratio have statistically significant positive influence on the financial health of banks where as the nonperforming loan ratio has statically significant negative influence on the financial health of the banks.
Keywords: Financial Distress, Panel Data, ZETA Analysis

1. Introduction

1.1. Background of the study

The issue of financial distress and bankruptcy is very important in the area of banking sector more than it is in other sectors. This is because of the fact that banks are the back bones of a given economy (Bridge 1998). If the banking sector of a given country faces financial crises, chances are high that it would lead to general economic crises (Demiguc and Detraigaialche 1998). It is obvious that financial institutions especially banks have a very great role in the economy of the nation. They not only facilitate saving and provide fund for almost every investment activities of a given nation but also have a greater role in the countries' foreign trade and the whole economy. So they can be considered as the nucleus of the nations' economy. If banks fail, it will lead to general economic crises (Demiguc and Detraigaialche 1998). The disasters of bank failure start with bank run, which is a situation in which all depositors came to windrow their money from the bank at one time and can end up with the general economic crises. The 2008 world economic crises, which resulted from the failing of the big financial institutions especially banks of USA, can be taken as a good example of the consequences of the financial distress of banks. Having this fact in ground it is very important to protect banks from being financially distressed and bankrupt. Banks indeed are different from other businesses in that they have different accounting rules, requirements for transparency, and economic functions. Banks reconcile the different needs of borrowers and lenders by transforming small size, low risk and highly liquid deposits into larger, riskier, and illiquid loans. Accordingly, results of financial distress studies conducted in the case of nonfinancial firms in Ethiopia such as (Andualem 2011) are not relevant for banks. Thus, it's reasonably motivating to conduct the research in the financial distress condition and its determinants of private commercial banks of Ethiopia.

1.2. Statement of the problem

The phenomenon of financial difficulties in Ethiopian companies had been occurred when global financial crisis in 2008, raw material price shock in 2009, and Ethiopian currency (Birr) devaluation in 2010 (Andualem 2011). These three different cases lead firm's financial distress of the manufacturing companies in Ethiopia. In 2009, when Ethiopian government reduced subsidy for raw material price locally and increased tax burden, this made cost of production increased and squeezing profitability (Mullu 2011) This made many companies be in distress as effect of a big losses and shortage of cash. The indication of this incidence can be recognized by increasing non performing loan (NPL) in commercial banks. The similar situation had in 2008, there was contraction of business activities in international market due to global financial crisis and NPL increased too (Carpeto, et al. 2010). Thus, financial institutions especially banks are very sensitive with internal and external factors.

The current trend in Ethiopian banking industry is that it is showing progress in performance and almost all banks are reporting positive accounting profit (Mullu 2011). However, this does not guarantee the going on concern of the companies, and it does not necessarily mean that all profitable companies are healthy enough to fulfill their sort term and long term obligations (Pranowo, et al. 2010) This is due to the fact that not all of profit can be cashed as source of funds or be available to for covering its obligations.

1.3. Objective of the research

The general objective of this study is to identify factors that influence (determine) the financial health of selected private commercial banks in Ethiopia.

1.4. Significance of the study

The research is expected to contribute first and for most; to the selected commercial banks under the study. Its findings are highly important for the management of the banks in the area of financial distress. The study also have greater role in indicating area to be more supervised. Further, it will serve as a bench mark and reference material for those who want to conduct further research in the same area. The findings of the study would contribute to the body of knowledge in a way that it adds value to the theory of financial distress theory. This is because some of its findings are in line with the existing theory and in some it directs areas for the future research.

1.5. Research hypothesis

In financial distress study different authors point different variables as the determinants of firm financial distress. Some the studies such as (Asquith, Grtner and Shefstein 1994), (Andualem 2011), (Chang-e 2006), (Gruszczynski 2004), (Lizal 2001), (Pranowo, et al. 2010), (Berg 2005) and (Almeida and Philippon, 1997) focus on none financial firms. Other researchers such as (Bridge 1998) (Carpeto, et al. 2010) (Ezeoha 2011, Purnanandam 2004, Sahut and Mill 2011) are focusing on bank distress. There are still other group in which (Altman and Hotchkiss 2005) developed a model that equally applied for both nonfinancial and financial firms to determine their financial healthiness and it is called A zeta model.

Banks are essentially different from other types of corporations. Their assets are longer term and less liquid than their liabilities. And their primary source of operating income is the interest that they earn through lending. Therefore, conventional accounting indicators of distress such as the interest coverage ratio cannot be applied to analyze the financial soundness of banks (Carpeto, et al. 2010). As a result, when considering financial institutions, it is needs to devise a special definition of distress which considers the fundamentally different characteristics of these institutions. Accordingly, insight of prior researches, the combined method is used in this study. Thus, ZETA score is taken as a proxy for financial distress as modeled by (Altman and Hotchkiss 2005) applied by (Ramili 2010) and (Amadasu 2012) and other five independent variable are selected based on the existing literature.

Before formulating the hypotheses for this study it's necessary to review the relationship of distress related variables from the prevailing research literatures. According to (Pranowo, et al. 2010) regardless of the model applied, the factors that are meant to determine of financial distress can be largely grouped into six classifications: liquidity, leverage, profitability, firm size and efficiency. Regarding the liquidity, profitability and leverage, they are incorporated in the Altman's Zeta Model. However, according to bank financial distress literatures such as (Carpeto, et al. 2010, Sahut and Mill 2011, Wubshet 2012, Ramili 2010) (Purnanandam 2004) (Demyanyk and Hasen 2010) and (Amadasu 2012) there are still other variables which are found to affecting the financial health of banks. These variables are presented in detail below.

No performing loan ratio: (Carpeto, et al. 2010)**,** used Nonperforming loan to total loan as a single accounting variable that can be used to measure bank financial distress. (Bridge 1998), asserted that high level of nonperforming loans had been the major cause of bank failure in Kenya, Nigeria, Uganda and Zambia.

Hypothesis one: H_0: non performing loan ratio has no impact on Z" score as a proxy of financial distress of the banks

H_0: non performing loan ratio has negative impact on Z" score as a proxy of financial distress of the banks

Capital adequacy: This ultimately determines how well banks can cope with shocks to their balance sheet. (Sahut and Mill 2011), the most important measure of the capital adequacy is the ratio of capital to total loan provided by the bank. Accordingly, the more capitalized the banks are, the lesser

Hypothesis tow: H_0: Capital to total loan ratio has no influence on Z" score as a proxy of financial distress (health) the banks

H_1: Capital to total loan ratio has no influence on Z" score as a proxy of financial distress (health) the banks

The ratio of interest income to total revenue: The earning of the bank is very important factor that affects the financial health of the banks. Increase in earning measured by net interest income to total revenue result in reduced financial distress. When the share of interest income out of the total income is higher, the financial health of the bank will increase. (Sahut and Mill 2011)

Hypothesis three: H_0: Net interest income to total revenue has no impact on Z" score as a proxy of financial distress of the banks

H_1: Net interest income to total revenue has positive/negative impact on Z" score as a proxy

of financial distress of the banks

Efficiency: The efficiency ratio is calculated by dividing the sum of non-interest income, which banks generate from sources other than interest from loan to operating expenses which are expenses other than interest payments to the depositors (Wubshet 2012).

Hypothesis four: H_0: bank efficiency has no impact on Z" score as a proxy of financial distress of the banks

H_1: bank efficiency has positive impact on Z" score as a proxy of financial distress of the banks

Size: the size of total assets is believed to have positive influence on financial health of the banks. (Andualem 2011) (Purnanandam 2004) (Demyanyk and Hasen 2010) and (Ramili 2010). Therefore, it is needed to test Hypothesis 5;

Hypothesis five: H_0: Bank size has no impact on Z" score as a proxy of financial distress of the banks

H_1: Bank size has positive impact on Z" score as a proxy of financial distress of the banks.

1.6. Scope of the Study

The scope of the study is within the private commercial banks in Ethiopia. The study focuses primarily on financial distress condition and its determinants in Ethiopian private banks. Seven years data from 2005 through 2012 will be used for the study.

1.7. Limitations of the study

The major limitation of the study is that it did not consider the public commercial bank in the country. The reason for not including the Commercial Bank of Ethiopia (CBE) which the only public commercial bank in the country is that: first, due to its unique characteristics that distinguish it from banks. That is, it is the oldest bank which is created by merging all privet banks together in the time of the Dergue regime when the latter nationalized the economy of the nation at that time (Alemayehu 2007). As a result it will not reasonable to compare banks that emerged after the economic reform with the bank which had been in the industry for so long i.e. before private banks were there. Secondly, it is also believed that CBE has government protection. The other limitation of the study is that it did not included the 2012/13 data due to the fact that the researcher was unable to access the data of the year for some of the banks under the study. This is due the fact that the some of the banks under the study did not prepare the official release of the financial statement of the year of 2012/13 during the data collection period of the research.

2. Literature Review

2.1. Review of Theoretical Literature

2.1.1. Definition

Among the scholars who defined financial distress from the perspective of financial institution particularly banks, (Chang-e 2006), defined *"as the condition of being in severe difficulties over money, especially being close to bankruptcy"* they asset that the difficulties come in whenever the banks cannot meet or have difficulty paying off its financial obligations to its creditors.

2.1.2. Determinants of financial distress

The chance of financial distress increases when the banks have high fixed costs, high combinations of illiquid assets, or incomes that are sensitive to economic downturns. (Asquith, Grtner and Shefstein 1994), whenever the countries in which the banks are operated are having a recession, the banks would be highly exposed to financial risks, bank crises and even worse: bank failure, (Demyanyk and Hasen 2010), who reviewed bank failure prediction methods has compiled various reasons of bank failures. Bank crises are more likely in countries with high real interest rates, high inflation rates, low GDP growth, and explicit deposit insurance system. Economies that are more susceptible to balance of payment crises also have a higher probability of experiencing banking crises (Demiguc and Detraigaialche 1998), (Wheelock and Wilson 2009) found that banks with higher ratios of loans to assets, lower capitalization, poor quality loan portfolios and lower earnings have higher risk of failure.

No performing loan ratio

(Carpeto, et al. 2010),used Nonperforming loan to total loan as a single accounting variable that can be used to measure bank financial distress. (Bridge 1998), asserted that high level of nonperforming loans had been the major cause of bank failure in Kenya, Nigeria, Uganda and Zambia.

The ratio of interest income to total revenue: The earning of the bank is very important factor that affects the financial health of the banks. Increase in earning measured by net interest income to total revenue result in reduced financial distress. Sahut and Mili (2011) accordingly, when the share of interest income out of the total income is higher, the financial health of the bank will increase

Capital adequacy: This ultimately determines how well banks can cope with shocks to their balance sheet. The most important measure of the capital adequacy is the ratio of capital to total loan provided by the bank (IBD). This is measured by total Equity divided by total loan and advances of the banks. Accordingly, when banks

become more capitalized, their distresses will decrease.

Firm efficiency

Firm's Efficiency or turnover ratios measure how productively the firm is using its assets (Brealey and Meyers 2000). The firm efficiency is measured in terms of its asset turnover, average collection period and average payment period. These components indicate the firm's viability as well as speed of turning over its assets within the year, which determines the firm's financial distress. Non distressed banks have higher efficiency score. (Sahut and Mill 2011)

In addition to these, the literature suggested that capital intensity is another determinant of financial distress through a role that alleviates the degree of distress because higher capital intensity implies a higher degree of fixed assets that could be used as collateral in case a firm experiences a financially distressing condition (Charalambakis, Espenlaub and Garrett 2008). However, another group of people argues that capital intensity represents operating leverage and tends to increase a firm's business risk (Brealey and Meyers 2000). This is because more fixed costs normally incur to a firm with a high level of fixed assets and such firm tends to show its Profitability to fluctuate more than others due to the fact that a high proportion of fixed costs exist regardless of revenue level. Study findings suggest that the capital intensity reduce financial distress for publicly traded U.S. lodging companies. Lee et al (2010).

2.2. Empirical Literature in Global Context

(Segoviano and Goodhart 2009) defines a set of banking stability measures which take account of distress dependence among the banks in a system, thereby providing a set of tools to analyze stability from complementary perspectives by allowing the measurement of (i) common distress of the banks in a system, (ii) distress between specific banks, and (iii) distress in the system associated with a specific bank. In their approach they define the banking system as a portfolio of banks and infers the system's multivariate density (BSMD) from which the proposed measures are estimated. The BSMD embeds the banks' default inter-dependence structure that captures linear and non-linear distress dependencies among the banks in the system and its changes at different times of the economic cycle. They assert that the BSMD is recovered using the CIMDO-approach, a new approach that in the presence of restricted data, improves density specification without explicitly imposing parametric forms that, under restricted data sets, are difficult to model.

(Nkusu and Muleisen 2011), analyze the link between nonperforming loans (NPL) and macroeconomic performance using two complementary approaches. They suggest that a sharp increase in NPL triggers long-lived tailwinds that cripple macroeconomic performance from several fronts.

Financial distress literature specific to the banking sector are limited in number when compared to that of non financial institutions. (Demiguc and Detraigaialche 1998), studied what happens to the banking system in the aftermath of a banking crisis by using aggregate and bank level data for several countries. They found that contemporary crises are not accompanied by declines in aggregate bank deposits, and credit does not fall relative to output, although the growth of both deposits and credit slows down substantially. Output recovery begins in the second year after the crisis and is not led by resumption in credit growth. Banks, including the stronger ones, reallocate their asset portfolio away from loans.

(Sinkey, Treza and Dince 2012), applied a ZETA model which is revised model of Z score analysis for predicting the bank failure. The purpose of their study was to test the cross-industry validity of the so-called zeta model. They used the test sample consisting of commercial banks that failed in United States during the early 1980s. They found that although it is not as accurate as the original zeta model, this version of the zeta model is successful in identifying bank failure in about 3 out of 4 cases. According to the researchers the possible reasons of the model being not as accurate as its original version are inability of bank accounting data to reflect market values, the presence of criminal misconduct as a major contributing factor in bank failures, and the process by which banks are declared insolvent.

(Carpeto, et al. 2010) studied distress classification measures in the banking sector. They tested the power of ten different accounting measures using media coverage as the benchmark for a sample of 1,175 banks which participated in merger and acquisitions or divestiture deals over the 22 years. According to the results of the study, a bank should be defined as distressed if the ratio of its non- performing loans to total loans is in the two highest deciles of the industry, using a three-year moving average.

(Gunay and Ozkan 2007), conducted a research with a purpose of proposing a new technique to prevent future crises, with reference to the last banking crises in Turkey. They used Artificial Neural Network (ANN) as an inductive algorithm in discovering predictive knowledge structures in financial data and used to explain previous bank failures in the Turkish banking sector as a special case of emerging financial markets. Their finds indicate that ANN is proved to differentiate patterns or trends in financial data. Most of the bank failures could be predicted long before, with the utilization of an ANN classification approach, but more importantly it could be proposed to detect early warning signals of potential failures, as in the case of the Turkish banking sector.

2.2.1. Empirical literature in African Context

Banking sector financial distress literature in African context is very limited. (Bridge 1998), examined the causes financial distress in local banks of Africa and its implication for prudential policy. His study concentrated on banks in Kenya, Nigeria, Uganda and Zambia. Accordingly many of the local banks set up in the above countries have been closed down or taken over by their Central Banks because of insolvency and illiquidity caused by non-performing loans. He asserts that the severity of bad debt problems was attributable to problems of moral hazard and adverse selection. According to him several factors contributed to the moral hazard on bank owners to take excessive risks with depositors' money. These included low levels of bank capitalization, access to public-sector deposits through the political connections of bank owners, excessive ownership concentration, and regulatory forbearance. The impaired loan quality due to the luck of skill and information problem is also another factor for failure of banks in the countries above.

(Ezeoha 2011), conducted a research with an objective of identifying the major determinants of bank asset quality in an era of regulation-induced industry consolidation, using the Nigerian case to demonstrate how consolidation can heighten incidences of non-performing credits in a fragile banking environment. He used panel data from 19 out of a total of 25 banks operating in Nigeria. A multivariate constant coefficient regression model is adopted as the estimation technique. The dependent variable in the model is quality of bank assets, taken as a proxy of the proportion of non-performing loans (NPL) to total loans; while operating efficiency, profitability, asset liquidity, loans to deposits ratio, predictability of depositors' behavior, size of bank capital, and board skill constitute the exogenous variables. The study reveals that deterioration in asset quality and increased credit crisis in the Nigerian banking industry between the periods 2004 and 2008 were exacerbated by the inability of banks to optimally use their huge asset capacity to enhance their earnings profiles. It shows that excess liquidity syndrome and relatively huge capital bases fueled reckless lending by banks; and that increase in the level of unsecured credits in banks' portfolios ironically helped to mitigate the level of NPL within the studied period.

(Samuel 2011), Studied the determinants of non-performing loans and the possibility of developing a composite indicator of financial crisis for Nigerian banks using data from 1985 to 2009. By employing a stepwise regression approach and specifying a logistic model, he found that unlike the many determinants of non-performing loans, changes in liquidity ratio was the only significant predictor variable influencing changes in the probability of financial crisis in Nigeria.

(Amadasu 2012)evaluated the financial distress of selected commercial banks in Nigerian from 2003 to 2007 with four packages of analysis, i.e. multiple discriminate analysis, ordinary least squares regression, correlation Matrix and Logit-Probit regression, for sophistication and effectiveness instead. The finding is that working capital/total asset (default ratio) among others should be closely taken care of and the major recommendation is that bank officials or corporate managers whose firms failed should not be with impunity.

(Muranda 2006), Conducted a research with the purpose of investigating the relationship between corporate governance failures and financial distress in Zimbabwe's banking sector. He used the case study method and discussed cases of banks currently in financial distress. Data collection was through desk research. The analysis is qualitative and used Judgmental sampling in selecting the eight abridged case. The finding of the research revealed that in all cases of pronounced financial distress, either the chairman of the board or the chief executive wields disproportionate power in the board. The disproportionate power emanates from major shareholding. The study shows that financial institutions in Zimbabwe underestimated the competitive forces that resulted from first, economic deregulation and later economic decline coupled with political meltdown. The study also found that an active role by regulatory authorities directly contributes to observance of good corporate governance practices

2.2.2. Empirical literature in Ethiopian context

When it comes to Ethiopian context, the gap in the financial distress literature is very wide. It is (Andualem 2011) who conducted a research on the determinants of financial distress of selected firms in beverage and metal industry of Ethiopia. His study estimated determinants of financial distress using panel data starting from 1999 to 2005. He used sample of 68 companies selected out of 116 share companies in the beverage and metal industry of Ethiopia. The results show that profitability, firm age, liquidity and efficiency have positive and significant influences to Debt Service Coverage as a proxy of financial distress. On the other hand, leverage has a negative and significant relation with DSC.

(Alemayehu 2007), Conducted a research in the Structure and Performance of Ethiopia's Financial Sector in the Pre and Post Reform Period: With Special Focus on Banking. His main focus is to compare the structure and performance of Ethiopian banking sector in per and post reform period. He examined this liberalization program by analyzing the performance of the sector before and after the reform. The study notes that given the recent nascent development the financial sector in the country, the relatively good shape in which the existing financial institutions find themselves, and given that supervision and regulation capacity of the regulating agency is weak, the government's strategy of gradualism and its overall reform direction is encouraging.

(Muluneh 2007), conducted the efficiency analysis of private commercial banks. In his research he examined the market structure of private commercial banks in the country's economy using the Herfindahl Index. He also tried to analyze cost efficiency of six private commercial banks operating in Ethiopia. He made efficiency analysis using quarterly panel data from the first quarter of fiscal year 1997/98 to the second quarter of 2005/06 and employing the Stochastic Frontier Analysis. The cost efficiency result of the banks under review shows an improvement from time to time during the period. During the first two quarters of 2005/06 on average the banks were found producing for Birr 1.101 an output that can efficiently be produced for Birr 1.0. From the firm specific determinants of efficiency, size of banks (measured by total assets and branch network) and age are found negatively related while capital is found to positively affect efficiency of the banks.

Apart from this so far as per the knowledge of the researcher there is no research conducted in the same topic in the banking sector of Ethiopia. The review of existing literature indicate that almost all of the researches conducted in this context in Ethiopian such as (Alemayehu 2007), and (Muluneh 2007) are simply examining the financial performance based on the accounting figures, and do not see the implication of that performance on the going on concern of the entity. And the other research by (Andualem 2011) that investigated the determinants of financial distress, have only focused on the case of non financial companies.

Ephrem and Grusuamy (2015) previously conducted financial health conditions of six selected banks from Ethiopia by applying Z" score Model of Altman (2000) however in their study they did not indicated what are the determinants of the financial health conditions of this banks. Thus, this study will have great role in filling the gap in banking sector financial distress literature in Ethiopian.

3. Methodology

(Saundra, Lewis and Thornhill 2007) suggest an explanatory study type of research design for researches that study "…a situation or a problem in order to explain the relationships between variables." So, since this study has the objective of assessing the financial distress condition of selected private Ethiopian banks, by evaluating the relationship among different variables, Additionally, (Ramili 2010) and (Pranowo, et al. 2010)also used the same research design to evaluate the determinants of financial distress of firms. (Andualem 2011) also conducted a research by applying the same design to determine factors affecting financial distress of selected Ethiopian manufacturing firms.

The study is based on quantitative data which is gathered from annual audited financial statements of the sample banks. Thus, the data type that which is used in this research is a quantitative one. The researcher chooses to study only six private commercial banks due to their age in the industry, which stayed in the sector for more than ten years since 1995 economics reform in the country.

3.1. Model Specification

(Altman, 2000) revise his financial distress model and developed a new Z score model which can be applied for non-manufacturing firms which embraces financial institutions as well. Accordingly, the new Z"-Score model is:

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

Where:

Z"= financial distress measure of financial institution
X1= Working capital / total assets,
X2= Net operating profit / total assets,
X3= EBIT / total assets (where EBIT is earnings before interest and taxes),
X4= BVE / total debt (where BVE is the book value of equity and total debt is book value of total liabilities)

Thus Z" will be used as a proxy for financial distress of banks as it measures the financial distress(financial health) conditions of banks, and as it has been applied by (Sahut and Mill 2011)

Accordingly, in line with the previous determinants of corporate financial distress researches, the study used Panel data multiple regression analysis (PDMRA) to find the relationship between the explanatory variables and firms financial distress as applied by (Sahut and Mill 2011) and (Pranowo, et al. 2010), (Andrade and Kaplan 1998), and (Carpeto, et al. 2010) and (Andualem 2011). The following are the regression model to be used for testing hypotheses.

$$FD=\beta o+\beta 1NPL+\beta 2NITTR+\beta 3CTLN+\beta 4EFC+\beta 5SIZt+\varepsilon$$

Where:

βo: is constant
β1, β2, β3, β4, β5 and β6 are coefficients of independent variables
FD is a dependent variable which is the output of the Z" score
NPL is non performing loan ratio
NITTR is net interest income to total revenue as the proxy for income
CTLN is Capital to total loan as a measure of the bank's asset quality

SIZE is the natural logarithm of the firm size measured in terms of volume of assets;
EFC is the banks efficiency ratio as a measure of management quality
ε is an error term.

4. Data Analysis and Discussions of the Result

4.1. Determinants of financial distress (health) of the banks

The financial distress measure of six selected banks from Ethiopia has been calculated by applying Z" score Model of Altman (2000) and the figures of this calculation are taken as the proxy for financial distress of banks. The detailed figures can be obtained from the appendix section of the paper.

i. Tests of the Classical Linear Regression Model (CLRM) assumptions

Before directly preceding to the actual regression analysis it is important to select class of panel estimator approaches and test for the assumptions of classical linear regression model (CLRM). There are basically two types of regression approaches used when panel data regression analysis is applied. These are fixed effects models (FEM) and random effects models (REM) (Brooks 2008).

When panel data is used it is obvious that either fixed effect or random effect approach has to be applied. Before deciding which approach to use it better to see which one is the appropriate for this very research based on the common practice of the scholars. Gujarati (2004) asserted that "… in a given panel, if the number of time series data is large and the number of cross-sectional units is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model and random effect model." Here, states that, the choice here is based on computational convenience. On this score, fixed effect model is preferable than random effect model as suggested by (Gujarati 2004). Since the number of time series (i.e. 10 year) is greater than the number of cross-sectional units (i.e. 6 private commercial banks) and adjusted R^2 value and Durbin-Watson stat value increases with the use of cross-sectional fixed effect model, fixed effect model is preferable than random effect model in this case. Thus, in this study fixed effect model is selected.

Regarding the assumptions of (CLRM), there are five basic assumptions of the classical near regression model. These are: the assumption that states the mean of the error for all X_is (independent variables) are zero {E(εi) = 0 for all$_i$}; the assumptions of homoscedasticity (no heteroscedasticity) which assumes that the variance of the errors is constant, {$V(\varepsilon_i) = \sigma^2$for all $_i$}; assumption of non autocorrelation that assumes the covariance between the error terms over time (or cross-sectionally, for that type of data) is zero; normality and multicollinearity. If these Classical Linear Regression Model (CLRM) assumptions hold, then the estimators determined by OLS will have a number of desirable properties, and are known as Best Linear Unbiased Estimators (BLUE).

ii. The mean of the error for all X_is (independent variables) are zero {E(εi) = 0 for all$_i$}

This assumption states that "it cannot the case that some members of the population have "*y*" value that is systematically below the regression line while others have "*y*" value systematically above it (Simonoff, 2011). As (Brooks, 2008) states, the prevalence of a constant term in the regression equation will prevent the assumption from being violated. Thus since there is a constant term in the regression equation used in this study this assumption is not violated.

iii. The assumptions of homoscedasticity (no heteroscedasticity), {var(u_t) = σ2< ∞}

According to this assumption, the variance of the errors is constant, {$V(\varepsilon_i) = \sigma^2$for all $_i$}. If the errors do not have a constant variance, they are said to be heteroscedastic (Brooks, 2008). The test undertaken to check for this assumption is known as a heteroscedasticity test. The following table presents the result of White test done to check if there is any heteroscedasticity. According to this assumption, it cannot be the case that the x/y relationship is stronger for some members of the population, and weaker for others. (Simonoff,2011). The null hypothesis for this test is stated as there is no heteroscedasticity. If the p-values for the F-statistic and Obs*R-squared are less than 0.05 then the null hypothesis for this test is not rejected.(Brooks,2008)

H_o: $\sigma=\sigma_i$ for all *i* (no heteroscedasticity)
H_1: $\sigma \neq \sigma_i$ for all *i* (heteroscedasticity)

Table 1. Heteroskedasticity Test: White

F-statistic	2.185771	Prob. F(5,54)	0.0692
Obs*R-squared	10.09923	Prob. Chi-Square(5)	0.0725
Scaled explained SS	7.205374	Prob. Chi-Square(5)	0.2058

Source: Eviews6 Output

The result of White (1980) test using the Eviews6 statistical software package is presented in table above. It shows that the F-, χ^2, and scaled explained SS versions of the test statistic give the same conclusion that reveals the absence of heteroscedasticity, evidenced by the p-values which is significantly greater than 0.05. Thus it is not possible to reject the H_o at 5% significance level so there is no hetroscedasticsity.

iv. Assumption of no autocorrelation {cov(u_i, u_j) = 0 for $i \neq j$}

Assumes the covariance between the error terms over time (or cross-sectionally, for that type of data) is zero. That is error term is uncorrelated over time. But if it is there exists autocorrelation. The existence of autocorrelation reveals that the error (residual) in specific time depends in the error (residual) previous to that period which in turn indicates that there exists other variable which is significantly affecting the dependent variable but not included in the model and thus, the OLS estimates are become biased and inconsistent.(Keilberg, 2005) hence to check for the existence of autocorrelation, a formal statistical test should also be applied.

Durbin and Watson test for autocorrelation

The simplest test is due to Durbin and Watson (1951). This test is a test for first order autocorrelation -- i.e. it tests a relationship between an error and its immediately previous value. One of the ways of testing and interpreting the test statistic would be in the context of a regression of the time t error on its previous value. (Brooks, 2008)

$$u_t = \rho u_{t-1} + v_t$$

Where, $v_t \sim N(0, \sigma^2 v_t)$ and ρ is the coefficient of autocorrelation

The DW test statistic has as its null and alternative hypotheses:

H_o: $\rho = 0$ (no autocorrelation)

H_1: $\rho \neq 0$ (autocorrelation)

The accept reject criteria for this test are (Simonoff 2011)

- For $T \rightarrow \infty$, the test statistic $DW \rightarrow 2 - 2W$.
- If there is no serial correlation, the DW statistic will be around 2 ($\rho = 0$)
- The DW statistic will fall below 2 if there is positive autocorrelation (in the worst case, it will be near zero).
- If there is negative correlation, the statistic will lie somewhere between 2 and 4

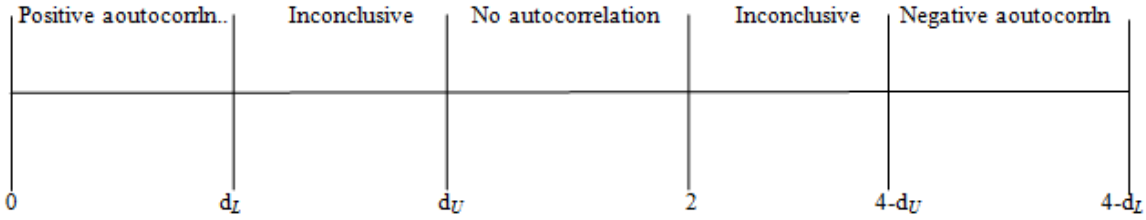


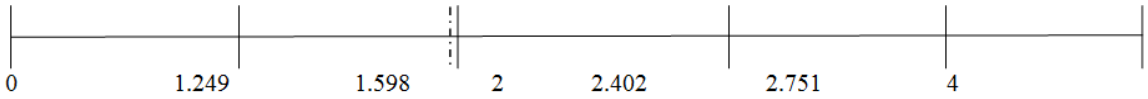
Figure 1 Rejection and non-rejection regions for DW test (Brooks 2008)

Unlike the other tests, the *DW* test does not follow a standard statistical distribution such as a t , F ,or χ 2. *DW* has 2 critical values: an upper critical value (d_U) and a lower critical value (d_L), and there is also an intermediate region leveled inconclusive. It is region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected! The rejection, non-rejection, and inconclusive regions are shown on the number line in figure below.

The decision rule:

- Reject the null hypothesis if *DW* is less than the lower critical d_L value since it shows the existence of positive autocorrelation; or if *DW* is greater than 4 minus the lower critical value which indicates that there is negative autocorrelation.
- The null hypothesis is not rejected if the *DW* is between the upper and 4 minus the upper limits (i.e. d_U, and 4- d_U) since it indicates that there is no autocorrelation.
- If the *DW* is between d_L, and d_U, or 4- d_U and 4-d_L, then the null hypothesis is neither accepted nor rejected since it cannot be sure if there is any autocorrelation.

The *DW* table value of d_L, d_U, 4- d_U and 4-d_L at N 60, K5 and 1% significance is presented below graphically.



Source: (author's computation)

Figure 2. Diagrammatical presentation of *DW* test

The result of the *DW* test which is obtained from the regression output is 1.595. According to the decision rule, this indicates that there is no autocorrelation problem since it is between d_U, and 4- d_U .

Breusch-Godfrey Serial Correlation LM Test

The output of the DW test indicates that there is nearly no autocorrelation. However the limitation of the DW test is that it tests only the first order autocorrelation, i.e. of whether consecutive errors are related to one another

using only a one-period lag (Brooks 2008). Thus it's better to conduct further test for autocorrelation of multiple period lag. Breusch-Godfrey Serial Correlation LM Test is preferred by most scholars for this matter (Simonoff 2011, Brooks 2008 and Habtmu 2012).

Thus, it is desirable to examine a joint test for autocorrelation that will allow examination of the relationship between error and several of its lagged values at the same time. The Breusch--Godfrey test is a more general test for autocorrelation up to the rth order. The model for the errors under this test is

$$u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + \rho_3 u_{t-3} + \ldots + \rho_r u_{t-r} + v_t \qquad v_t \sim N(0, \sigma^2 v_t)$$

The null and alternative hypotheses are: the null hypothesis is stated as there is no autocorrelation between errors and several of its lagged values throughout the time. The alternative hypothesis is stated as there is autocorrelation between errors and several of its lagged values throughout the time.

H_o: $\rho_1 \neq 0, \rho_2 \neq 0$ and…and $\rho_r \neq 0$ (no Autocorrelation)

H_1: $\rho_1 = 0, \rho_2 = 0$ and…and $\rho_r = 0$ (Autocorrelation)

The following table shows the results of the Breusch--Godfrey test conducted by using the Evies6 software.

Table 2. Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.515556	Prob. F(5,54)	0.0505
Obs*R-squared	11.33512	Prob. Chi-Square(5)	0.0551

Source: Eviews6 output (author's computation)

The conclusion from Eviws6 output of the test in this case is that the null hypothesis of no autocorrelation is not rejected since the *p-value* is greater than a 5% significance.

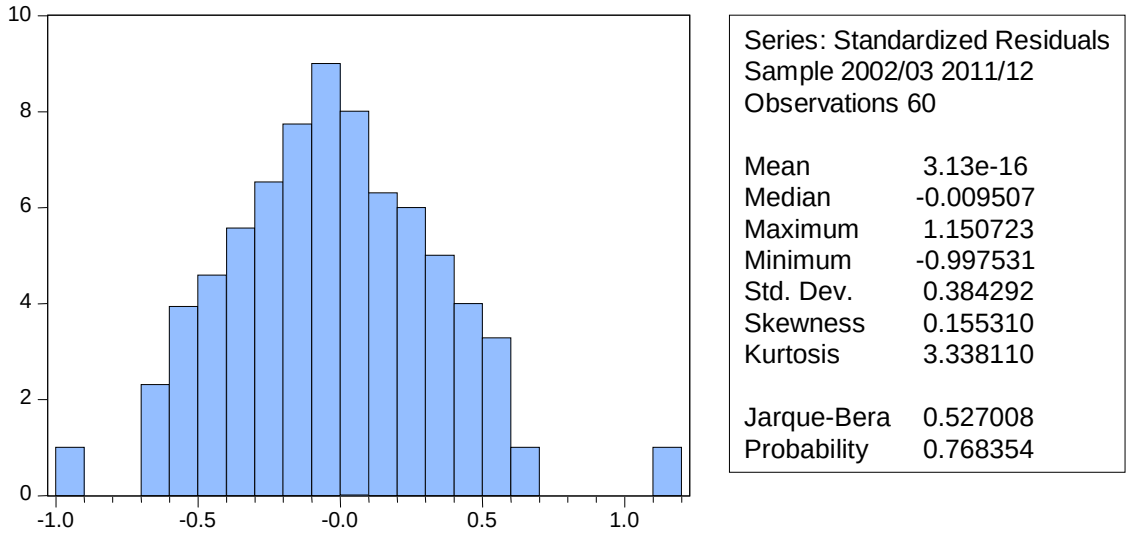
v. Assumption of normality (errors are normally distributed ($u_t \sim N(0,\sigma^2)$)

The other test of CLRM assumption is about the normality assumption $(u_t \sim N(0, \sigma^2))$, which is required in order to conduct single or joint hypothesis tests about the model parameters. The following figure indicates the normality assumption test result of Eviews6. According to (Kreiberg, 2005), for sample sizes that are sufficiently large, violation of the normality assumption is virtually inconsequential. Based on the central limit theorem, the test statistic will asymptotically follow the appropriate distribution even in the absence of error normality. In smaller samples, however, it is important to meet this assumption for the p-values of the t-test to be valid.

The null hypothesis for this test is that the data is not normally distributed. The alternative hypothesis of this the data is normally distributed. Can be rewritten as:

H_0: The residuals do not follow a normal distribution

H_1: The residuals follow a normal distribution



Source: Eviews6 output (author's computation)

Figure 3graphical presentation of normality test

As it can be observed from above diagram that normality assumption holds, this is because the coefficient of kurtosis is 3.33 which close to 3 and the skewness is also close to zero with coefficient of 0.15.

vi. Testes for the Absence of Multicollinearity Assumption

This assumption is an implicit assumption that is made when using the OLS estimation method is that the

independent variables are not correlated with one an-other. If there is no relationship between the independent variables, they would be said to be *orthogonal* to one another which means there is no evidence that one independent variable affects the other. If the independent variables were orthogonal to one another, adding or removing a variable from a regression equation would not cause the values of the coefficients on the other variables to change. However, a small degree of association between independent variables will almost always occur but will not cause too much loss of precision in a real world practice (Brooks, 2008). But a problem occurs when the explanatory variables are very highly correlated with each other, and this problem is known as multicollinearity.

The hypotheses for this test are:

H_0: There is multycorrniality among the independent variables

H_1:There is no multycorrniality among the independent variables

The following table presents the result of multycorrniality test conducted using the Eviws6.

Table 3. Tabular presentation of multycorrniality test

Correlation	EFC	NITTR	NPL	CTLN	SIZ
EFC	1.000000				
NITTR	0.558683	1.000000			
NPL	-0.153858	0.249612	1.000000		
CTLN	-0.124261	0.268369	0.367157	1.000000	
SIZ	-0.458383	-0.649168	-0.085644	-0.706035	1.000000

Source: Eviews6 output (author's computation)

Different authors different level of acceptable degree of correlation among the independent variables. According to Hair et al. (2006) correlation coefficient below 0.9 may not cause serious multicollinearity problem. However, other scholars such as Cooper and Schendlar (2009) suggested that a correlation between independent variables should not exceed 0.8 if it is, it indicate high correlation among the independent variable. Still another author; Malhotra(2007) suggests that the maximum acceptable level coefficient of correlation among independent variable is 0.75. Thus since the maximum coefficient of correlation observed in the table 0.69 which is fairly below the Malhotra(2007) criterion, there is no mulicorriniality among the independent variables.

b. Discussion of regression analysis results

In this part, the output of the fixed effect panel regression analysis is discussed. In the above parts the researcher discussed the results of the tests for validity of the classical linear regression model (CLRM) assumptions. Accordingly, model has passed all the important tests of the CLRM assumptions. Thus, now what remains is to discuss the results of the regression analysis which is done by applying the fixed effect panel regression using the Eviews6 software.

The result of regression analysis indicate, capital to loan ratio and net interest income to total loan are statistically significant and have positive influence on the financial distress, whereas Non performing ration has significant but negative influence to financial distress. Surprisingly the result also indicates that efficiency and firm size have no significant influence on the financial distress.

As it can be observed from the result of the regression presented in the table below, The coefficient of determination R-square (R2), which measures the degree to which the model explains the actual variations in the dependent variable, indicates that the extent of 63.29% behavior of financial distress variables can be explained by the independent variables which are included in the model. Overall, F-statistic 21.34 with p-value 0.0000 since it indicates that all of the coefficients are not jointly zero. Thus, the regression model is feasible.

Table 4.Regression result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.718347	1.273132	3.706094	0.0005
NPL	-0.030736	0.009527	-3.226167	0.0021***
CTLN	0.006569	0.002959	2.219718	0.0307**
NITTR	0.084733	0.044664	1.897126	0.0632*
EFC	0.012694	0.013920	0.911885	0.3659
SIZ	0.006271	0.004040	1.552265	0.1264

R-squared	0.664036	Durbin-Watson stat	1.595680
Adjusted R-squared	0.632929		
F-statistic	21.34635		
Prob(F-statistic)	0.000000		

***, ** and * indicates significant at 1%, 5%, 10% significance level respectively.
Source: Eview6 output(author's computation)

c. Tests of research hypothesis

Once the regression analysis is run and the outputs are obtained the next step is testing of the research hypothesis which were formulated at the beginning of the research work. There are eight hypotheses in this study which were developed with the aim of achieving the second objective of the study. Accordingly, tests for each hypotheses of this study are discussed below in detail.

Hypothesis one: H_0: Non performing loan ratio has no impact on Z" score as a proxy of financial health of the banks

H_1: Non performing loan ratio has negative impact on Z" score as a proxy of financial health of the banks

As it can be evidenced from the output of the regression analysis presented in table 5.4 non performing loan ration (NPL) has significant influence on the financial health of the banks with coefficient of -0.030736 and the p-value of 0.0021. This enables to reject the null hypothesis at 1% significance. The beta coefficient of nonperforming loan ratio indicate that the one unit increase in NPL will result in one 0.030736 decrease in the Z" score of the banks. This in turn will lead to deterioration of financial health of the banks since low Z" mean high financial distress which even can lead to bankruptcy.

Hypothesis tow: H_0: Capital to total loan ratio has no influence on Z" score as a proxy of financial distress (health) the banks

H_1: Capital to total loan ratio has positive influence on Z" score as a proxy of financial distress (health) the banks

The second hypothesis of the research is about the effect of Capital to total loan ratio on the financial distress of the banks. As it can be observed from the regression analysis output, the Capital to total loan ratio, which is the proxy of capital adequacy, has a positive influence of 0.006569 with the p-value of 0.0307. this indicate that the fires null hypothesis that states profitability has no significant impact on financial distress of the bank is rejected at 5% degree of confidence. Thus, it can be said that there is statistical evidence that one unit increase in Capital to total loan ratio will increase the financial distress measure of Z" score by 0.006569 times which will improve the financial health condition of the banks.

Hypothesis three: H_0: Net interest income to total revenue has no impact on Z" score as a proxy of financial distress of the banks

H_1: Net interest income to total revenue has positive/negative impact on Z" score as a proxy of financial distress of the banks

Based on the result of the study, net interest income to total revenue (NITTR) has a positive relation with financial distress with coefficient 0.084733 with a p-value 0.0010. As a result the null hypothesis is rejected at 10% significance. This reveals that one unit increase in NITTR will lead to 0.084733 times increase in the Z score of the bank which is financial health (distress). When the Z score of the banks improves, the financial health of the banks also improves.

Hypothesis four: H_0: Bank efficiency has no impact on Z" score as a proxy of financial distress of the banks

H_1: Bank efficiency has positive impact on Z" score as a proxy of financial distress of the banks

It is surprising to know that the bank efficiency has no statically significant influence on the Zeta score of the selected private commercial banks. The beta coefficient of the bank efficiency is 0.012694 with the p-value of 0.3659. This reveals that the effect of the efficiency ratio is insignificant. Thus, since the probability of

committing type one error as indicated by the p-value is very high, it is not possible to reject the null hypothesis. This deviation from the expected positive influence could be due to the reason that noninterest income to non interest expense has been used as the proxy of banks efficiency. Because in most of the previous researches particularly (Asquith, Grtner and Shefstein 1994) and (Andualem 2011), which found positive relation between efficiency and financial health used variables such as profit per number of employees and earnings before interest and tax (EBIT) respectively as proxies of firm efficiency.

Hypothesis five: H_0: Bank size has no impact on Z" score as a proxy of financial distress of the banks

H_1: Bank size has positive/negative impact on Z" score as a proxy of financial distress of the banks

It is surprising again to know that the bank size has no effect on the financial distress statues of the banks. The output of the regression analysis indicates that the size of the banks has no significant effect on their financial health for the entire study period for which data for the research is obtained and analyzed. The beta coefficient of size variable is 0.006271which appears to look companies with large size are more healthier but the p-value 0.1264 reveal that size is statistically insignificant, and it does not enable rejecting of null hypothesis even at 10% significance. Thus the null hypothesis is not rejected since the degree of committing type one error p-value is greater than 10% which is the maximum degree to which a given researcher is allowed to take the risk of committing type one error in social science. The possible reason for this could be attributable to the variable which is employed as the proxy of firm size. In this research natural logarithm of total asset which is used as a measure of firm size is different from the natural logarithm of total sales which is used as a proxy of firm size by other researchers such as (Andualem 2011) and (Chang-e 2006).

5. Conclusion

Generally some of the findings are consistent with researches which are previously done by others scholars. Finding that capital to loan ratio, net interest income to total revenue ratio have positive influence on the financial health of banks is consistence with the findings of (Sahut and Mill 2011)and (Pranowo, et al. 2010). Again the finding that nonperforming loan ratio has negative influence on the financial health of the banks is consistent with the finds of Andrade and Kaplan (1998), and (Carpeto, et al. 2010)who asserted that increased nonperforming loan is indicator of financial distress and (Bridge 1998) AS recommendation, the nonperforming loan and the leverage ratio of the banks which are found to negatively influencing the financial health of the banks need to be closely watched and taken care of. This is because, as per the finding of the study, increase in NPL ratios will lead to decrease in the financial distress measure of the ZETA score which means decrease in financial health conditions of the banks.

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Appendix1: Data Used for Regression

Firm	year	ZETA	EFC	NITTR	NPL	CTLN	SIZ
DB	2002/03	2.71	0.6696	0.1203	0.0744	0.95	2.0117
DB	2003/04	2.46	0.6119	0.1385	0.0672	0.7761	1.9279
DB	2004/05	2.56	0.6094	0.1551	0.0621	0.2274	2.0362
DB	2005/06	2.38	0.6923	0.1469	0.0595	0.8471	1.5104
DB	2006/07	2.21	0.6594	0.1266	0.0589	0.387	1.1542
DB	2007/08	2.39	0.6598	0.1138	0.0739	0.2313	2.1974
DB	2008/09	3.05	0.6271	0.1088	0.03	0.4263	2.2713
DB	2009/10	3.71	0.5754	0.1071	0.0338	0.5754	2.817
DB	2010/11	3.34	0.5005	0.1087	0.1839	0.8678	1.9773
DB	2011/12	3.41	0.4708	0.1072	0.1202	0.7972	2.0622
AIB	2002/03	2.8	0.6774	0.1007	0.0956	0.7919	1.1202
AIB	2003/04	2.92	0.6269	0.0978	0.0736	0.7684	2.2224
AIB	2004/05	3.17	0.603	0.0914	0.0866	0.797	3.1825
AIB	2005/06	2.97	0.5333	0.0892	0.0578	0.7871	2.1131
AIB	2006/07	2.64	0.5455	0.0891	0.0547	0.7826	2.0261
AIB	2007/08	2.72	0.5781	0.0872	0.0381	0.7191	2.3982
AIB	2008/09	3.27	0.5537	0.0754	0.1751	0.7284	2.8129
AIB	2009/10	3.9	0.4945	0.0641	0.124	0.6832	2.9039
AIB	2010/11	4.23	0.4373	0.0575	0.0494	0.7391	3.4845
AIB	2011/12	3.74	0.3864	0.0578	0.1054	0.7826	2.7637
BOA	2002/03	2.59	0.7531	0.0859	0.1287	0.6061	1.6121
BOA	2003/04	3.63	0.5743	0.0938	0.1475	0.7544	2.4423
BOA	2004/05	3.76	0.5484	0.1086	0.0698	0.9492	2.9538
BOA	2005/06	3.02	0.6309	0.1043	0.0397	0.9167	3.7987
BOA	2006/07	2.45	0.6009	0.0974	0.1224	0.3188	2.9714
BOA	2007/08	2.47	0.6254	0.092	0.0841	0.6688	3.0322
BOA	2008/09	4.56	0.5934	0.0839	0.0485	0.5221	3.991
BOA	2009/10	3.69	0.579	0.0835	0.0525	0.7826	2.0811
BOA	2010/11	3.59	0.4417	0.085	0.0839	0.5333	2.0555
BOA	2011/12	3.16	0.4255	0.0803	0.077	0.5455	1.5513
WB	2002/03	2.8	0.6774	0.1007	0.0347	0.5781	1.2668
WB	2003/04	2.72	0.6269	0.0978	0.0351	0.0079	1.1898
WB	2004/05	2.97	0.603	0.0914	0.099	0.0077	1.8808
WB	2005/06	3.11	0.5333	0.0892	0.0845	0.008	2.1619
WB	2006/07	2.55	0.5455	0.0891	0.0418	0.0079	1.1722

WB	2007/08	3.15	0.5781	0.0872	0.0459	0.0078	2.0322
WB	2008/09	3.63	0.5537	0.0754	0.0398	0.0072	2.7651
WB	2009/10	4.52	0.4945	0.0641	0.0462	0.0073	3.2374
WB	2010/11	4.31	0.4373	0.0575	0.0376	0.0068	2.8138
WB	2011/12	4.2	0.3864	0.0578	0.0335	0.0074	2.5226
UB	2002/03	2.51	0.6696	0.1203	0.0877	0.95	1.1058
UB	2003/04	2.11	0.6119	0.1385	0.1122	0.7761	1.0628
UB	2004/05	2.17	0.6094	0.1551	0.0847	0.7972	2.0603
UB	2005/06	2.16	0.6923	0.1469	0.0556	0.7919	2.0072
UB	2006/07	1.85	0.6594	0.1266	0.0673	0.7684	1.0473
UB	2007/08	2.23	0.6598	0.1138	0.1116	0.797	2.1176
UB	2008/09	2.89	0.6271	0.1088	0.0737	0.7871	2.2037
UB	2009/10	3.66	0.5754	0.1071	0.0504	0.7826	2.8244
UB	2010/11	3.87	0.5005	0.1087	0.3189	0.7191	3.281
UB	2011/12	3.88	0.4708	0.1072	0.3577	0.7284	3.4561
NIB	2002/03	3.67	0.7531	0.0859	0.1021	0.6832	3.0023
NIB	2003/04	2.87	0.5743	0.0938	0.1045	0.7391	1.8951
NIB	2004/05	3.21	0.5484	0.1086	0.1781	0.56	3.2194
NIB	2005/06	3.54	0.6309	0.1043	0.1984	0.6119	3.5348
NIB	2006/07	3.02	0.6009	0.0974	0.2932	0.3188	2.7032
NIB	2007/08	2.95	0.6254	0.092	0.3878	0.6688	2.399
NIB	2008/09	3.43	0.5934	0.0839	0.2771	0.5221	3.5084
NIB	2009/10	3.99	0.579	0.0835	0.2123	0.2974	3.9046
NIB	2010/11	4.23	0.4417	0.085	0.2929	0.1187	4.7649
NIB	2011/12	3.64	0.4255	0.0803	0.3208	0.5015	2.9842

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