Determinants of Credit Risk in the Commercial Banking Sector of Belize

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Abstract
An empirical study was carried out to predict the determinants of the credit risk in the commercial banking sector of Belize by using an econometric model. The model by utilizing a panel data from 2006 to 2012 at bank level for the 5 private sector banks has shown some unique determinants of the credit risk in the Belizean commercial banking sector. The model used in the study has a high R square which is a reflection of the fitness of the model and its predictability. The results showed that the lagged nonperforming assets had a strong and statistically significant positive influence on the current non-performing assets. There is a significant inverse relationship between the current GDP and the credit risk. Lagged Inflation showed a positive and significant influence on the NPL. The study reveals that both macroeconomic and bank specific factors play crucial role in determining the credit risk of the commercial banking sector.

Key words: Determinants, Credit Risk, Non Performing Loans, Commercial Banks, Econometric Model

Introduction
The banking sector is the driving engine of the economic growth for any country. Financial stability and security are the important and crucial components of the banking sector. Banking in modern economies is all about risk management because the economic repercussions of a bank failure could be catastrophic on the entire financial system. Unsound risk management practices governing bank lending played a critical role in recent episodes of financial turmoil (Rahman et al., 2004; Atikogullari, 2009). The Basel Committee on Banking Supervision defines credit risk as “potential default of a borrower to meet the obligation in accordance with the agreed term” (BIS, 2005). The Non-Performing Loans (NPL) is directly related to the financial performance of a bank and is the contributing factor to the credit risk of the banking system. An increase in the NPL of a bank suggests that there is a high probability of a large number of credit defaults. This in turn affects the net-worth of the bank and also erodes the value of the bank’s asset. Historical evidence suggest that most bank failures are directly associated with poor management of credit risk (Levine et al., 2000, Jimenez and Saurina 2006).

The problem of NPL is not only affecting the banks but also the whole economy. When loans and advances made by banks turn out as non productive then they will become Non Performing Loans which is defined as “an asset or an account of a borrower that the bank classified as sub standard or doubtful asset (Bank for International Settlements, 2005)”. In most countries where there is a significant public sector banks, the regulatory authority such the Central Bank prescribes regulations to effectively monitor and manage the NPL. Due to the recent global economic meltdown and the recession in major economies, combined with low GDP growth rate in developing economies such as Belize, the commercial banking sector can be exposed to higher credit risk. In this regard the current study was carried out to quantify the contribution of various bank specific and macroeconomic determinants of the credit risk in the sector banks in Belize by using an econometric model.

Literature Review
Rajan (1994) explained that there exists a herd behavior among the bank managers during expansion periods which may be one of the reasons why NPL accumulates immediately after the loan...
boom periods. They suggested that this could be due to the fierce competition among commercial banks and peer pressure. Berger and DeYoung (1997) while studying the US commercial banking sector found that cost efficiency of bank operations is a direct indicator of the ratio of Non-Performing Loans (NPL) to total loans. A study by Salas and Saurina (2002) using panel data on Spanish commercial and saving banks, revealed that various macroeconomic and bank specific factors such as growth in GDP, rapid credit expansion, bank size and capital adequacy ratio influenced the Non Performing Loans.

Berger and Udell (2004) suggested that the time lapse between successive loan bust periods could be a contributing factor for banks to accumulate bad loans in the future and this could be due to the high turn-over of credit officers in the banking system due to various reasons. The pro-cyclical nature of the accumulation of bad loans is due to the fact that during the bust times, the value of collateral erodes and there is an overall decline in the credit standards (Gabriel et al. 2006). Hu et al. (2004) found an inverse relationship between bank size and NPLs. Their argument is that large banks have better risk management strategies that usually translate into more superior loan portfolios than their smaller counterparts. Hu et al. (2004) also found that the banks with higher government ownership recorded lower non-performing loans.

Using advanced panel data techniques, Das and Ghosh (2007) examined the factors affecting problem loans of Indian state-owned banks for the period 1994-2005, taking into account both macroeconomic factors as well as microeconomic variables. Their findings revealed that at the macro level, GDP growth and at the bank level, real loan growth, operating expenses and bank size play an important role in influencing problem loans. Thiragarajan et al (2011) while analyzing the determinants of credit risk in the public and private sector commercial banks in India showed that the lagged nonperforming assets had a strong and statistically significant positive influence on the current nonperforming assets of the commercial banks. They also noted that there is a significant inverse relationship between the current GDP and the credit risk for both public and private sector banks.

**Source of data and Methodology**

The data for macroeconomic and bank specific variables were collected from the Central Bank of Belize from its website https://www.centralbank.org.bz. The data for bank specific variables were collected for 5 commercial banks operating in Belize namely Scotia Bank, First Caribbean International, Belize Bank, Atlantic Bank and Heritage Bank for the period from 2006 to 2012. The panel data for the variables were grouped and analyzed. The study used a linear regression model to empirically analyze the contributions of the bank level and macroeconomic variables of the credit risk associated with the commercial banking sector.

Based on the review of the existing literature in this field, the study used a total of 11 variables including 7 bank specific variables and 4 macroeconomic variables. The Non-Performing Loans (NPL\textsubscript{i,t}) which is the ratio of the problem loans to total loans for bank group i in year t is the dependent variable and for this the study used the logarithmic transformation of the current NPL. The lagged NPL (NPL\textsubscript{i,t-1}) can positively influence the current NPL level because the problem loans of one year are not completely written off and has a carryover effect. The credit growth in one year can have an influence on the loan defaults in the subsequent years since credit appetite of banks during boom period over look strict credit criteria. Hence the study used current loan growth rate (ALOANS\textsubscript{i,t}) and lagged loan growth rate (ALOANS\textsubscript{i,t-1} and ALOANS\textsubscript{i,t-2}) of the banks for two consecutive years. Since efficiency is critical for the competitiveness of the bank and its risk management issues, the study included the variable efficiency (INEFF\textsubscript{i,t}) which is measured by the ratio of non interest expenses to net interest income and non interest income. Size of the bank with reference to its total assets (SIZE\textsubscript{i,t}) is considered another bank specific factor that might have an influence indirectly on the level of problem loans. The study also included two macroeconomic factors that may have direct influence on the credit risk namely the GDP and the
Inflation. The Gross Domestic Product can significantly influence the borrower’s ability to repay the loans as evidences suggest that higher GDP growth will have a negative correlation with current NPL. So current ($\Delta GDP_{i,t}$) and lagged ($\Delta GDP_{i,t-1}$) GDP were used as independent variables. Inflation can also affect the purchase power of consumers and hence current ($INFLA_{i,t}$) and lagged inflation ($INFLA_{i,t-1}$) were also included.

Based on the above discussions the following econometric model equation was developed where the ratio of problem loans here called as Non Performing Loans (NPL),

$$NPL_{i,t} = \beta_1 NPL_{i,t-1} + \beta_2 \Delta LOANS_{i,t} + \beta_3 \Delta LOANS_{i,t-1} + \beta_4 \Delta LOANS_{i,t-2} + \beta_5 \Delta INEFF_{i,t} + \beta_6 SIZE_{i,t} +$$

$$\beta_7 \Delta GDP_{i,t} + \beta_8 GDP_{i,t-1} + \beta_9 INFLA_{i,t} + \beta_{10} INFLA_{i,t-1} + \eta_i + \varepsilon_{i,t}$$

**Results and Discussion**

Figure 1 shows the trend in the NPL for the commercial banks for the period from 2006 to 2012. There has been a consistent increase in the ratio of non-performing Loans (non performing loans to total loans) for most of the commercial banks from 2006 to 2010. The Belize Bank and Heritage Bank both have shown a significantly higher NPL compared to the other commercial banks. First Caribbean International Bank and Soctia Bank have kept their NPLs under control. Atlantic Bank has a moderate level of NPL. Figure 2 shows the NPL to total loans for all the commercial banks combined. The figure highlights that the NPL gradually increased from 2006 and peaked in 2010 at more than 15% of the total loans, However the NPL started to reduce after 2010. This is significant because Belize faced the consequence of the serious credit risk problems that crippled most of the developed economies. The global recession that preceded the sub-prime mortgage of 2007-2008 in the US and other major economies has influenced the Belize’s macro economic conditions in 2010.
Figure 1: The ratio of Non Performing Loans (NPL) to total loans for the 5 commercial banks in Belize from 2006 to 2012

Figure 2: The cumulative ratio of Non Performing Loans (NPL) to total loans for the 5 commercial banks in Belize from 2006 to 2012
Figure 3 shows the trend in the Inflation and GDP growth for the period from 2006 to 2012. The inflation rate and the GDP growth has similar trend from 2006 to 2011. For 2009, the inflation was in negative territory where as GDP growth was zero. For 2012, the GDP growth is 5% where as the inflation remained low at 1.2%. Studies show that lagged GDP can negatively influence the NPL. This can be seen in the Figure 2 where the NPL peaked in 2010. We also expect lower NPL in the upcoming year as GDP has increased in 2012.

Figure 3: The trend in the real GDP and inflation rate from 2006 to 2012

Table 1 displays the econometric model results for commercial banking sector. The goodness of fit is explained by the value of the term “R square”. The goodness of fit for the model using the data for the commercial banking sector is 94.5% (R square = 0.945). This means 94.5% of variation in dependant variable Y is explained by the all 10 independent variables included in the model.

The model has predicted a statistically significant (p = 0.005) positive contribution of the lagged (1 year) NPL towards the dependent variable current NPL (credit risk). This suggests that the NPL of the previous year has direct positive impact on the current year’s NPL. The loan growth (current) and loan growth (1 lag and 2 lag) had positive impact on the credit risk although it was not statistically significant. However the “Spread” contributed negatively to the credit risk and was statistically significant. The variables “Inefficiency” and “Size” has a positive influence but both are not statistically significant. The variable current GDP had a significant negative influence on the current NPL. The Inflation (1 lag) has a strong and significant positive influence on the current NPL.
Table 1: Econometric Model Results for Commercial banking sector in Belize

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta Coefficient</th>
<th>t value</th>
<th>P value of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged NPA</td>
<td>0.852**</td>
<td>18.239</td>
<td>0.003</td>
</tr>
<tr>
<td>Loan Growth</td>
<td>0.392</td>
<td>1.427</td>
<td>0.389</td>
</tr>
<tr>
<td>Loan Growth (1 lag)</td>
<td>0.041</td>
<td>1.594</td>
<td>0.357</td>
</tr>
<tr>
<td>Loan Growth (2 lag)</td>
<td>0.021</td>
<td>0.382</td>
<td>0.786</td>
</tr>
<tr>
<td>Inefficiency</td>
<td>0.155</td>
<td>2.432</td>
<td>0.248</td>
</tr>
<tr>
<td>Size</td>
<td>0.586</td>
<td>0.400</td>
<td>0.758</td>
</tr>
<tr>
<td>Current year GDP</td>
<td>-0.363*</td>
<td>-6.920</td>
<td>0.048</td>
</tr>
<tr>
<td>GDP (1 lag)</td>
<td>-0.605</td>
<td>-1.482</td>
<td>0.378</td>
</tr>
<tr>
<td>Inflation (current)</td>
<td>0.559</td>
<td>1.482</td>
<td>0.490</td>
</tr>
<tr>
<td>Inflation (1 lag)</td>
<td>0.556*</td>
<td>6.130</td>
<td>0.026</td>
</tr>
<tr>
<td>R square</td>
<td></td>
<td>0.945</td>
<td></td>
</tr>
</tbody>
</table>

* and ** Significant at $P = 0.05$ and 0.005 respectively

This study highlights the carry over effect of NPL from a previous year on the current year NPL. Studies in the past have linked the interrelationship between the outstanding Non-Performing Loans (lagged) to the current year’s Non-Performing Loans (Jimenez and Saurina 2006, Das and Ghosh 2007). In their study, Jimenez and Saurina (2006) showed that lagged NPL can positively influence the current NPL level because the problems loans are not completely written off and has a carryover effect. The credit growth in one year can have an influence on the loan defaults in the subsequent years as studies support the theory that credit appetite by banks during boom period over-look strict credit criteria in the loan approval process (Ahmad and Arif 2007). Studies in the past suggest that there is a lag period of at least two years between the credit growth and growth in NPLs. Our study also showed that the loan growth contributed positively to the credit risk.

Similar to a previous study conducted by Das and Ghosh (2007) our study also supports the negative correlation between the GDP and total NPL for the current period. Salas and Saurina (2002) also found a similar inverse relationship between GDP and non-performing loans in Spanish commercial banking sector. Inflation (current and 1 lag) showed a positive impact on the problem loans as one would expect as the cost of goods and services would go up during high inflation and hence affecting the debt serving ability of the borrowers. Safakli (2007) while studying the credit risk associated with Cyprus banks found a similar positive correlation between inflation and problem loans. This study found that most of the determinants have similar effect as shown in other studies.

Conclusion

Belize as a small developing economy has withstood and survived the recent global financial meltdown and posted a decent GDP growth when many major economies were in recession. This is possibly due to the macroeconomic policies of the government and the prudent financial policies and regulations implemented the Central Bank of Belize as well as the Commercials banks. Although the NPL level had increased from 2007 to an all time high in 2010, the gradual decrease of the NPL during the past two years is giving some hope to the banking sector and will have improve their profitability in the coming years. Since the lagged NPL is the major contributing factor for the current NPL, the commercial banks must have prudent credit policies to avert any ill affect of the credit risk. The GDP growth in 2012 would help the banking sector in reducing their Non-Performing Loans to an acceptable level in the near future.
Since most studies predict a two year lag period between the boom in credit growth and the growth in NPL, the banking sector must be vigilant in managing the NPLs in the coming years.

References