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FACTORS AFFECTING THE PAYMENT PERFORMANCE OF LOAN: AN EMPIRICAL INVESTIGATION ON CREDIT DEFAULT RISK

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Abstract

This paper explores the relationship between consumer credit clients' payment performance i.e. credit default risk and some demographic, macroeconomic, locational and financial variables. Data to examine this relationship is obtained from the customer records of a private bank in Bangladesh. Some statistical tools are used to evaluate the data. Financial variables rather than the demographic characteristics of clients have a significant influence on customers' pay back performance. Thus, the longer the maturity time, the higher the interest rate, and the higher the credit default risks. This suggests bankers to apply appropriate adjustments to financial variables in order to minimize credit default risk.

Key Words: Loan default; Payment Performance; Interest; Income and Bank

Introduction

During the last decade, importance of risk management in credit has increased for both borrowers and lenders, especially, in the developing countries. For this reason, banks and financial institutions started revising their lending policies. The default risk literature shows borrowers may experience adverse situations, which cause difficulties for them in paying their loan obligations. The three options that the mortgagors or lenders may consider in such circumstances are: prepayment, forbearance and default. While facing difficulties with mortgage repayments, a household may decide to prepay its mortgage if the property has positive equity. The final option of default on a mortgage (leading to foreclosure) tends to take place when the mortgagor is unable to pay the loan obligation and the market value of the property is currently less than its original purchase price. Models proposed by Straka (2000) and Wheaton *et al.* (2001) have expressed default as the end result of some trigger event, which makes it no longer economically possible for the homeowner to continue being the owner. Negative equity makes it advantageous to default rather than sell at a loss.

From the perspective of the creditor, predicting future loan delinquency is important. The literature shows, there are a number of financial and non financial factors that are systematically used to assess the credit worthiness of individual borrowers.

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Income Factors

The main cause for mortgage default is a fall in household income (Pennington-Cross, Yezer & Nicholas, 2000). Much of the empirical research on income factors takes the consumption function as the starting point (Keynes, 1936, Hall and Mishkin, 1982, Hayashi, 1982). The major durable consumption expenditure for households is housing expenditure (mortgage repayments). The work of Hall and Mishkin (1982), Hayashi (1982) provide evidence that the time path of consumption expenditures for households that are credit constrained differs from that of families for which borrowing constraints may not be binding. A limitation of these studies, however, is that the data used do not directly identify credit-constrained and unconstrained marginal households. Instead, these studies presume that families with either low wealth-to-income ratios or low savings rates are credit constrained, while high wealth families are not (Pennington-Cross, Yezer & Nicholas, 2000).

Macroeconomic Factors

Defaults vary greatly due to overall macroeconomic and regional effects. For instance, for a given loan-to-value ratio, the probability of a loan having negative equity varies with house price inflation, which varies greatly across location and time. With the international macro economic shocks reflected in recession in the Australian economy, the danger that outstanding mortgage debts of marginal homeowners would exceed the true market values of their homes causes considerable concern about the propensity for defaults.

These factors are used to measure if there is an improvement in affordability or not for homebuyers. This indicator captures the effect of average household income and average costs of repayment of loans on affordability. It is estimated as a ratio of median annual family income to the average loan repayment multiplied by 10. This indicator is provided quarterly by the Real Estate Institute of Australia and AMP Banking.

Affordability problems may arise due to a number of factors:

- Decline in income caused by relationship break down, loss of job and others
- Rising loan repayment costs, including mortgage and rate payments

Locational Factors

In most cases, indicators of increased risk are associated with the location of the borrower. This is especially true for indicators that would affect the willingness of the borrower to pay their mortgage in the future due to decline in the value of the property. Appraisal uncertainty is high in localities where the volume of transactions is low, especially in underserved (poor social amenities/services) areas (Van Order and Zorn, 2000). According to Mills and Lubuele (1997), in developed countries like the US, locational factors play a crucial role in determining property value uncertainty. As noted by Nadler et al., (1993), locational factors are important not only for homebuyers but also for mortgage lenders who find regional differences to play a major role in determining foreclosure rates. The low-income borrower and homebuyer in underserved areas are not generally satisfied with the location of his/her property.

Demographic Factors

As noted by Burrows' (1998), Vandell and Thibodean's (1985) and Zorn and Lea's (1989) work, households most likely to default are those headed by a person who is divorced or separated, a single person or household with several dependants, with unskilled manual occupation, or an uneducated person who is unemployed most of the year. Economic theories regard education and training as investments in human capital that increase the scope of gainful employment and improve net productivity of an individual. The benefit of education and training has been underestimated in most of the studies on default. The present research attempts to fill this gap.

After controlling for income, credit and locational factors, it is generally argued that minority households where most of them are poorly educated engaged in unskilled work or are recent immigrants to Australia are more likely to default than the others. However, studies such as Mills and Lubuele (1994) challenged the conventional wisdom and empirically proved that minority households who were skilled had performed equally well with regard to loan repayment The present study examines and tests if demographic factors such as education, age, occupation (skilled/unskilled), migrant status, play a major role in the determinant of default risk in Western Australia.

There are basically six functional responsibilities associated with credit lending activities; (1) assessment of the customer’s credit risk, (2) making the credit granting decision with regard to credit terms and, where relevant, credit limits, (3) collecting receivables (debts) as the fall due and taking action against defaulters, (4) monitoring customer behavior and compiling management information, (5) bearing the risk of default or bad debt, (6) financing the investment in receivables (debtor) (Summer and Wilson, 2000). This study deals with the fourth step of credit lending activities. Thus, the study focuses on collecting statistical data on consumer behavior, evaluating the collected data and trying to find managerial outcomes. These outcomes enable financial institutions to evaluate alternative lending policies and minimize their credit default risks and constitute the credit- scoring model for some consumer credit types such as home loans, car loans, and individual support loans.

More specifically, this study aims to examine the relationship between the consumer credit clients’ payment performance and some demographic variables (such as age, occupation) and some financial variables (such as income, interest rate, maturity).

Materials and Method

The study has been an exploratory study. Both primary and secondary data have been used. Researchers have prepared a questionnaire on the basis of survey of existing literature as well as discussions made with some executives associated with the banking sector. The researchers distributed 80 questionnaires to those banks customers who have been systematically selected and will be willing to participate in the procedure. Participants were given a letter from the researchers to explain the nature of the study.

Among the sample population, participation will voluntary and participants will be assured that responses would be treated with confidentiality.

In the conceptual model of the study, five independent variables and one dependent variable has been presented. It shows the relationship between consumer credit clients' payment performance and interest rate, sex, income, number of period and occupation.

To analyze a quantitative data the researchers explored the internal structure and measurement qualities of the proposed hypothetical constructs for Credit operation process. To achieve the researchers' goal stepwise regression, correlation analysis, mean and also another statistical technique were used. All of these statistical techniques have been used to test the hypotheses to measure the level of significance of credit sector. Stepwise regression analysis was carried out to test the strength of associations between the study variables. Stepwise regression is also given individual r^2 square for each independent variable with dependent variable which is absent in case of simultaneous regression analysis because it gives the aggregate r^2 square. Henushek and Jackson (1977) suggested that stepwise regression is a useful procedure in determining most significantly related variables in explaining the behavior in question and in this procedure allows the data "to tell the best model". ANOVA has also been used to measure the differences across groups (interest rate, sex, income, number of period & occupation). We constructed a conceptual model to explain the relationship between consumer credit Clients' payment performance and interest rate, sex, income, number of period and occupation. The equation of the model is as follows:

Payment performance = $\beta 0 + \beta 1$ (Interest) + $\beta 2$ (Sex) + $\beta 3$ (Income) + $\beta 4$ (Number of Payments) + $\beta 5$ (Occupation) + E1

Hypothesis of the study

The following hypothesis has been formulated and tested:

Hypothesis 1

Intuitively, probability of credit delinquency increases when interest rate increases due to increases in payback amount.

Hypothesis 2

Intuitively, females have less credit delinquency risk due to their precautionary motives

Hypothesis 3

Probability of credit delinquency increases when the income decreases.

Hypothesis 4

Intuitively, probability of credit delinquency increases when maturity increases.

Hypothesis 5

Intuitively, people working in private sector tend to pay back their loans on time more than others do since people working in private sectors are fixed income earners.

Result and Discussion

Table 1 shows payment performance of the loan clients with the relation of different influencing factors like sex, interest rate, income, number of period and occupation. The following table 1 show the mean and the standard error of the variables used in the study. All the comments are at 5% level of significance. The mean value of payment performance .9303 (std. error = 0.01), which implies that 93.03% of households on an average repay their loans as scheduled while 6.97% default on their payments in banks. The Interest on Loan is dependent upon many condition(X1), Mean is 0.9050, (std. error = 0.02), which implies that 90.50% repay their loans as scheduled while 9.50% default on their payments due to interest rate Increases.

Table 1: Payment performance

Variables	Alpha Value	Mean	Std. Deviation	Std. error
Payment performance	0.832	0.9303	1.10635	0.01
Interest	0.578	0.9050	1.09797	0.02
Sex	0.676	0.9380	1.23782	0.06
Income	0.928	0.2048	1.10531	0.03
Number of period	0.855	0.6879	0.98035	0.04
Occupation	0.860	0.5233	0.99465	0.01

Females have less credit delinquency risk due to their precautionary motives (X2) with Mean 0.9380, (std. error = 0.06), which implies that 93.80% females repay their loans as scheduled while 6.20% default on their payments. The estimated lifetime income is dependent upon the weekly income of a person. Lifetime income (X3) is expressed with Mean= 0.2048 with std. error = 0.04. Which implies that 20.48. % repays their loans as scheduled while79.52% default on their payments because of less Income. The Number of payment is dependent on certain condition(X4), Mean is 0.6879, (std. error = 0.04), which implies that 68.79% repay their loans as scheduled while 31.21% default on their payments because the longer term, the more probability of being missed installment because of forgetfulness and carelessness etc. In addition, occupation is a variable with 0 skilled and 1 unskilled, where households on an average 52.33% (Std. error =0.01) are either in skilled or in semiskilled occupation.

Correlation Analysis

A Correlation analysis used to determine the degree of linear association between two sets of variable, each consisting of several variables at 5%level of significance. In Table-2 we see that, the payment performance and the interest rate have a strong positive linear relationship, which degree of influence probability is 0.907. The payment performance and sex variable have a linear relationship. Which degree of influence probability is 0.70 indicates strong positive relationship. So, we say females have less credit delinquency risk due to their precautionary motives. The payment performance and the income have a strong positive linear relationship, which degree of influence probability is 0.958, i.e. income variable have most significant influence in payment performance. The payment performance and the number of period and the payment performance and Occupation have a strong positive

linear relationship, their degree of influence probability are 0.915 and 0.895 respectively. So, we say people working in private sector tend to pay back their loans on time.

Table 2: Correlation matrix of payment performance and other variables

Particulars	Payment performance	Interest	Sex	Income	Number of period	Occupation
Payment performance	1					
Interest	0.907	1				
Sex	0.760	0.222	1			
Income	0.958	0.890	0.744	1		
Number of period	0.915	0.931	0.861	0.917	1	
Occupation	0.895	0.940	0.860	0.943	0.977	1

Linear Regression Method

This method is the extension of bivariate linear regression using more than one independent variable. In Table-3 the value R is 0.944 and the Co-efficient of determination R^2=.891 indicates that the variation of the independent variables is accounted for 89.10% of the variance in the dependent variable.

Table 3: Linear Regression

Variables	R	R^2
Model	0.944	0.891

Stepwise Regression

Stepwise regression is used to determine the contribution of the factors on the variation of the dependent variable. It has been found from the analysis of stepwise regression result of table 4 that the independent variable- interest rate and number of periods have been found to have influenced the dependent variable- payment performance at 5% level of significance. The values of R square are 84% and 89% respectively. This indicates that the independent variable- interest rate has accounted for 87% variation and number of periods has accounted for 89% in payment performance.

We also see from the table that independent variables – sex, income and occupation have significantly influenced the payment performance and the R square value indicate the variation of the independent variables are accounted.

Table 4: Stepwise regression among the variables

Variables	**B**	**SEB**	**β**	**R^2**	**∆R**
Step 1				0.837	
Interest rate	0.914	0.181	0.810		
Step 2				0.860	0.023
Sex	0.596	0.117	0.528		
Step 3				0.873	0.013
Income	0.382	0.133	0.338		
Step 4				0.891	0.018
Number of periods	0.914	0.181	0.810		
Step 5				0.881	0.027
Occupation	0.895	0.223	0.500		

Conclusions

This research has used direct approach to the collection of primary data and consulted available existing literature for defining research problem and collecting secondary data and used financial, statistical, and stepwise regression techniques for analysis of data collected for study. Based on the findings of this research following policies have been put forwarded for reducing the credit risk in Bangladesh:

- The interest rates and other features of the Retail Products of the bank should be revised as significant numbers of the customers were currently dissatisfied with the present features of that. Banks should restructure the interest rates of its Retail Products to attract more valuable customers.
- In the face of competitive and customer dominated scenario BANKS must come up with innovative products to meet up the demand of time. Such as study loan, medical loan, debit card, dual currency credit card etc.

In general, the evaluation of credit risk models will always be more difficult than market risk models because of their underlying time horizons. Thus, qualitative methods, such as stress-testing and sensitivity analysis, will always be important in the evaluation of credit risk models.

In this paper, our propose evaluation methods based on statistical resembling that can provide quantitative measures of model accuracy for credit risk models. These methods provide performance evaluation in a cross-sectional environment. The proposed statistical tools are relatively simple; are well known in the forecast evaluation and risk management literatures; and are general enough to be used on any type of credit risk model. Several aspects of the proposed evaluation methodology require additional research. For example, the impact of specific parameters, such as the number of credits to be included in a simulated portfolio and the nature of the simulated portfolio's weights, must be better understood. However, most of the future research in this area should be on actual comparisons of credit risk models over various credit datasets.

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