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The Investigation of Effective Factors on Credit Repayment of Melii Bank in Kohgiluyeh and Boyer Ahmad Province 2007-2012

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ABSTRACT

The present research investigates effective factors on credit repayment of Melli bank in Kohgiluyeh and boyre ahmad during the years of 1386-1391. The needed statistics and information were obtained through both Melli bank and filling 200 questionnaires which were conducted through SRS simple random sampling in Kohgiluyeh and boyre ahmad province. In order to achieve objectives of the study and by breaking down the borrowers into two groups of payers and failures based on standard Tobid model, type one (censored) with the rate of loan default as dependent variable based on maximum likelihood (ML) and is estimated by using Eviews software. The results of this study show that the rate of loan defaults in this province is more than 58 percents. In addition, the results of this research conducted through the Tobid model in this province show that among the effective variables the level of income, level of education, economic boom have direct and positive impact on the rate of defaults. On the other hand, the commission rate credits, the length of repayment, numbers of family members, amount of loan and amount of repayment have negative and significant effect on the rate of defaults. Finally, experts' supervision and the kind of guarantee have also a bit of a stretch on the rate of reimbursement.

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INTRODUCTION

Assimilation rates of facilities in all monetary networks (banking) of the country are one of the deferred collection strategies. Moreover, economic conditions like inflation, recession ruling is another factor which in recent years causes the grand borrowers of the banks who proceed to get banking resources with the goal of generating activities cannot repay their debt to the banks. Deferred demands can be considered as one of the problems of banks and financial institutions that unfortunately have high figures in our country. That's why one of the important operations is attracting funds, savings and the use of meeting financial needs of economic activities. In another words, the banks were financial intermediation between depositors and clients asking facilities and by using its resources and people's savings, they engage in lending. by having bulky liquidity of society, banks can play important role in economic system. And have significant effect on regulation of economic relation in the society [20].

In most of developing countries, public credit institutions are less concerned about repayment. Because they compensate their defaults from the government or income sources with government's permission. Experience of supported credit programs in repayment has not been promising. Several studies have reported the rate of defaults of credits plans in the US, latin America, middle east between 20 to 30 percents. Defaults have been serious problem for survival of credit institution. and if an institution loses its 20 to 30 percents of its properties due to defaults, it will fail [3]. In banking system, the profitability of banks will be ensured when the customer and applicants of facilities in due time and based on trust, confidence and reputation act in paying the loan and credit demand. But unfortunately increase in the remaining of deferred demands has been observed.

This paper seeks to answer the question of what caused the rise and growth of deferred remaining demands at Melli banks of Kohgiloye and Boyre ahmad. so there will be four hypothesis in this article:

- 1- Interest rates of banking facilities and repayment have positive impact.
- 2- there is positive relation between repayment and the income of borrowers.

3- The economic boom and repayment have positive relation.

4- there is significant relation between validation of customers and their repayments.

In order to test the mentioned hypothesis, first the review of literature and then the research method will be under investigation. Afterwards, the data will be analyzed and at the end conclusion and recommendation resulting from it will be discussed.

Research Methods:

This research from the perspective of purpose is applicable. And to achieve the purpose of the study, two groups of statistics and data are needed. The statistics and data related to payment facilities are gathered from Melli banks and its branches in this province. Statistics and data questionnaire of individual were field data and through the questionnaire and interviews with borrowers whose facility profiles for sampling of credits archives working in this province were extracted and listed.

The statistics and data collection of questionnaires were collected from credit branch of Melli bank in the province through SRS simple random sampling. Among the current and available cases of each branch, some of them were selected randomly. In addition, for the analysis of effective factors on repayment of banking credits the Tobit model with limited dependent variable of default rates of loan were used.

For this purpose, the borrowers were divided into two groups based on the term of delay in repayment. Based on domain of dependent variable, the Tobit models have been known with title of censored and shortened Regression models. These models are used in different situation based on the needs. In this study, for knowing the limitations of effective factors on repayment of credits in Melli bank in Kohgyloye and Boyre ahmad, the censored Tobit model with the dependent variable of defaults rate were used.

The Tobit model is statistical method for panel data which were described by James Tobin in 1958 for explanation of the relation between a non-negative dependent variable like y_i and independent variable of x_i .

In this model, there is an invisible variable like y_i^* which is dependent on variable x_i in a linear way. Therefore we have the following relation:

$$y_{it}^* = x_{it}\beta + \alpha_i + \epsilon_{it}$$

The variable y_i will be equal to invisible variable. Everywhere, this variable is more than zero otherwise is equal to zero. It means:

$$y_{it} = y_{it}^* \text{ اگر } y_{it}^* > 0$$

$$y_{it} = 0 \text{ اگر } y_{it}^* \leq 0$$

Although we consider the coefficient of this model as an interpretation of regular regression (the level of effect of independent variable on dependent one), we make the mistake. Instead, we should interpret it with combination of two concepts:

1- The level of changes of dependent variables gets its lowest point when it is more likely to be the low birth.

2- it is more likely to be lower than the expected value of the dependent variable when more weight is low.

The common assumption in this model, we can apply the effect of variable. It means that we consider that α_i, ϵ_{it} have dependent normal distribution that is independent of values of x and mean of zero and variances respectively are $\sigma_\alpha^2, \sigma_\epsilon^2, \dots$

If β in a model which y_i is regression on x_i , estimated through OLS way, the estimate will be incompatible. Takeshi Amemiya in 1973 showed that the maximum likelihood estimator for the model is consistent for Tobit model.

Likelihood function can be written as follows:

$$f(y_{i1}, \dots, y_{iT} | x_{i1}, \dots, x_{iT}) = \int_{-\infty}^{+\infty} \pi f(y_{it} | x_{it}, \alpha_i, \beta) f(\alpha_i) d\alpha_i$$

In a way that it can be obtained from the following equation:

$$f(\alpha_i) = \frac{1}{\sqrt{2\pi\sigma_\alpha^2}} \exp\left\{-\frac{1}{2} \frac{\alpha_i^2}{\sigma_\alpha^2}\right\}$$

And ... is obtained based on this relation, if $y_{it} > 0$, I will be equal to

$$f(y_{it} | x_{it}, \alpha_i, \beta) = \frac{1}{\sqrt{2\pi\sigma_\epsilon^2}} \exp\left\{-\frac{1}{2} \frac{(y_{it} - x_{it}\beta - \alpha_i)^2}{\sigma_\epsilon^2}\right\}$$

If $y_{it} = 0$, it would be equal to :

$$1 - \Phi\left(\frac{x_{it}\beta + \alpha_i}{\sigma_\epsilon}\right)$$

And functional form of Tobit model in this study is:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \dots + \beta_{18} X_{18} + u_i$$

Y_i is dependent variable and X_1 to X_{18} are explanatory variables of the model which are respectively as the following:

Y_i = dependent variable of default rates, X_1 = age, X_2 = the numbers of family members, X_3 =education, X_4 = occupation, X_5 = income, X_6 = type of facilities, X_7 =the kind of loan, X_8 = kind of activity, X_9 =the type of consumption or loan application, X_{10} =amount of loan(million rial), X_{11} =the rate of commission rate(percent), X_{12} =the amount of repayment (thousand Toman), X_{13} =the length of repayment (year), X_{14} =time to get a loan, X_{15} : Type of collateral or guarantees, X_{16} =the distance of place of living(Kilometer), X_{17} : the effect of experts' monitoring, X_{18} =time of experts' monitoring, U_i =is a component of random error and is explained as the following.

Dependent variables:

Dependent variable is the rate of defaults of facilities of Melli bank in Kohgyloye abd Boyre ahmad by the borrowers. That for those borrowers who paid installment on time is zero and for those who have defaulted in received funds are raged between 0 to 100 based on their reimbursement and those who have never reimbursement got value 100.

Variables related to individual characteristics:

Age: this variable has been entered in according with years of age:

Education: the value of this variable for illiterate borrowers is zero, for that having primary school is 1, guidance school is 2, high school 3 and having college education 4 is considered.

The borrowers' main jobs: Is an implicit variable that for unemployed borrowers is considered zero for the others, the value 1 is regarded.

Variables associated with received funds:

The amount of loan: this variable represents the amount of received loan of borrowers based on Rials.

Commission rate:

it includes the amount of interest that the borrower must pay to the bank for a loan that is different based on the kind of credit facilities.

The length of repayment:

This variable includes the number of years during which the borrower must repay his/her loan.

The background of using banking facilities:

It includes the number of years which the borrowers had used facilities of the bank.

The times of loan :

it includes the number of times that the borrower over their activities in several years have received facilities from Melli bank.

Variables associated with the credit system:

Credit value:

This variable for the borrowers having good credit with the banks is considered 1 and for other borrowers will be zero.

The period of waiting time for getting the loan:

It includes period of time from demanding the loan until receiving the loan .

experts' Supervision on credit consumption:

The number of times that experts monitor the use of loan.

Data collection instrument:

Data collection procedures and questionnaire statistics in different branches of Melli bank in this province is from SRS simple random sampling. Among available cases, some of them were selected randomly from each branch.

Statistical population:

Statistical population is defined as complete set of possible sizes or recorded information of one attribute trait. We had some deduction about complete gathering of all branches. The statistical population of the research

is identified with one or some common traits. Statistical population of this research includes all borrowers of Melli bank in Kohgiluyeh and Boyer-Ahmad between 1386-1391 years.

Sampling:

For determining the size of this research sampling, the Cochran sampling which is better than others and is less error in comparison to others has been used. Its formula is like the following:

$$n = \frac{N(t.s)^2}{N.d^2 + (t.s)^2} \quad \text{formula 1-3: sample size (Ranjbaran, 1387)}$$

N= population size

n=sampling size

t=1/96

d=desirable possible accuracy

s= standard deviation (population)

For estimation standard deviation of studied population and for determination of desirable possible accuracy, 50 samples of population with trait of miscounting were randomly selected and had pre-test. The obtained standard deviation from a variable rate of repayment is 3/37. And desirable possible accuracy has been calculated through this formula:

$$d = t \frac{s}{\sqrt{n}} \rightarrow d = 1/96 \times \frac{3/37}{\sqrt{50}} = 10/3 \quad \text{the formula of desirable possible accuracy}$$

To increase the accuracy of the results, it was adjusted to 3.5.

Thus, sample size calculation is based on Cochran formula :

$$n = \frac{28316(1/96 \times 37/3)^2}{28316 \times (5/3)^2 + (1/96 \times 37/3)^2} \approx 190$$

For increasing the accuracy of calculation, this rate is increased with 200 people. Eviews software was used for analyzing the model.

Data analysis:

In this study, for investigation of effective factors on repayment of credit banks based on Tobit model with limited dependent variable the default rate of loan was used. For this purpose, the borrowers were divided into 2 groups based on their delay in repayments. The group who has not had any delay in their repayment had value zero. Those who had never repay got value 100 and other borrowers who had have delay in repayment were ranged between 0 to 100. Based on dependent variable, the Tobit model is known both as Truncated model and Censored model. They are used suit to the needs.

If the observations being put out of specific range excluded, the Tobit model would be brief. In addition if everyone can view the set out observation, it would be called Censored model. In this study for knowing the limitations and effective factors on credit repayment of Melli bank in Kohgiluyeh and Boyer-Ahmad, the censored Tobit model with dependent variable of default rate was used. Also, due to the continuous and sustained nature of the dependent variable of default rates, this model has been used instead of including implicit variable in Logit and Probit models.

Model assessment:

Regarding the importance of bank, credit banks in economy of the country and the need for scientific needs about knowing the effective factors on repayment of banking credit, some methods for analysis are needed.

Colman considers the most important ones including Programming Method, estimated two-stage theory of duality, direct estimation and dependent variable Limited Model.

The value of log likelihood shows the overall significance of regression. Moreover, the value of correlation coefficient between real and predicted value of dependent variable (as an appropriate index for the value of model) equals 0/47.

At first the significance of independent variable will be tested. For performing the test, the *t* statistics has been used. If the absolute value of calculated *t* would be greater than *t* in the table, the desired coefficient will be significant which shows the relation between dependent and independent variable. This point is provided in used software at significant level related to independent variable. And if this rate is lower than predicted error (0/05), the significant independent variable is confirmed. The *t*-test is used when the variable is at relative or distance level.

In *t*-test by regarding the obtained *t* and the significant level of *t*, the significance of the variable can be confirmed or rejected. The significance of the variable is confirmed when the value of *t* is high and the significance level of *t* is lower than 0/05. But if the significance level of *t* is more than 0/05 and the value of *t* is low, non-significance of the variable is confirmed. The values of repayment stretches in banking credit in comparison with explanatory variables are shown in below table. The present findings of the research show that factors like age, the numbers of family members, education, occupation, income (thousand Toman), the use of facilities, kind of loan, the type of activity, the use or application of loan, amount of loan (million Rials),

commission rate of facilities(percent), amount of repayment(thousand Tomans), the length of repayment(years), the time that it takes to get a loan(days), type of collateral or guarantees, the distance of place of living(km), the effect of experts' supervision, the term of experts' supervisions are important factors which determine the repayment of banking credit. And other variables do not show significant impact and are omitted from the model.

The maximum likelihood estimates of the factors contributing to the repayment of bank credit in the Tobit model in Kohgiluyeh Boyerahmad province.

T statistics	كشش	Coefficient	Name of variable	
3/48	0/79	+ 0/359 *	Age	X1
3/09	-0/56	-0/318**	The number of family members	X2
2/25	0/70	+2/34***	Education	X3
3/26	0/92	+3/01***	Occupation	X4
2/18	0/95	+5/74**	Income	X5
3/69	0/05	+1/07*	Kind of loan	X7
1/78	-0/54	-2/269**	Amount of loan	X10
1/25	-0/93	-5/35*	Commission rate of facilities	X11
1/06	-0/38	-2/40*	Amount of repayment	X12
3/02	0/84	+3/04*	The period of repayment	X13
1/12	-0/36	-0/195*	type of collateral or guarantees	X15
3/56	0/53	+0/195	Distance of place of living	X16
1/14	0/29	+0/745***	The effect of experts' supervision	X17
1/89	-	+5/35***	Constant	C
	0/47		R ²	
	-201/79		Log likelihood	
	0/627		F(z)	

Source: the research findings of *, **, *** are respectively significant at levels 1, 5, 10 percents

Based on the results of table, all variables except the variable of distance between places of living have significant effect on repayment of banking credit. The income and the rate of commission facilities are more sensitive than other variables of the method. In a way that level of income has positive impact and the commission rate has negative effect.

The repayment of bank credit, in comparison to job and the length of the repayment period is also elastic.

Interpretation of the results of the model is calculated based on the amount of tension. Based on the obtained results, the greatest positive impact belongs to income, the borrowers' jobs, the length of repayment at level 95, 92, 84 percents. That this result was based on our expectation .the welfare of borrower with his/her repayment has direct effect on banking credit. Moreover, the length of repayment has positive and significant impact on repayment of banking credit. it represents the fact that the more the length of repayment is, no repayment will be delay. Of course this is subjected to this point that by increasing the length of repayment, the repayment interest should not be increased. It can be interpreted that by increasing 1 percent of income, the occupation, length of repayment , repayment of banking credit will be increased respectively 95, 92, 84 percents.

The repayment of banking credit in comparison to age, education show more elasticity.

In a way that one percent increase in level of education and age can make a change in repayment of banking credit respectively 0/70, 0/79 percents.

The variable of the kind of loan and experts' supervision have positive effect on repayment of banking credit. But this impact is statistically significant. Because by changing these variables , great changes in repayment of credits cannot be observed.

Perhaps the reason for this oversight is weak or non-performance of inspectors and officials' monitoring. The notable point in this research is the significant negative of variables of the number of family members, amount of loan, commission rate, the amount od repayment and type of collateral. The maximum and minimum tension in the group of variables in the commission rate and type of collateral or guarantee are respectively 0/93, 0.36 percents. this means that with an increase 1 percent in commission rate and type of collateral and guarantee, the repayment of banking credit will be decreased at 0/93, 0/36 percents. It is obvious that increasing in commission rate has suitability of attention on repayment of banking credit.

In addition, as in Iran banking system, the guarantee and collateral have been limited nowadays and access to these have some problems for customers, based on what has been seen the type of collateral has little elasticity for the clients. The amount of loan and the amount of repayment with elasticity equals -/54 and -/38 percents had significant and negative effect on repayment of banking credit. Because the higher the amount of loan, the harder the clients repay it. It means that by increasing one percent in amount of loan and amount of repayment, the repayment of credits will decrease at levels 54 and 34 percents.

Different scenarios, some of the variables that influence the repayment of bank loans given that the aim of the study was to identify factors that affect the repayment of bank credit. Its results represent the fact that education, type of job, income, the length of repayment are important effective variables which are known. Thus, Understanding the base of customers' behavior on these variables contributed to the better analysis of the results of this study.

So the aim of this study is to investigate the relation and effectiveness between explanatory variables and dependent limited variable of defaults. These explanatory variables include, the number family members, education, income (thousand Toman), amount of loan (million Rail), commission rate(percent), amount of repayment(thousand Toman), the length of repayment(year), effect of experts' supervision, economic condition, type of guarantee and collateral. Below , this relation between variables are explained below:

Relation	Dependent limited variable	Explanatory variable	Row
Significant and inverse	Default rates	Number of family members	1
Direct	Default rates	Level of education	2
Negative and significant	Default rates	Income(thousand Toman)	3
Negative and significant	Default rates	Amount of loan and repayment	4
Significant and inverse	Default rates	Commission rate (percent)	5
Extensibility	Default rates	The length repayment	6
Low Extensibility	Default rates	Effect of experts' supervision	7
Direct and significant	Default rates	Economic boom	8
Negative and significant	Default rates	Type of guarantee and collateral	9

One of the main objectives in the regression analysis is to explain the endogenous variables. In this study, The endogenous variable is default of banking credit.

Thus, this equation is followed:

$$\bar{Y} = \frac{\sum Y_i}{n} = \frac{69}{119} = 0/58$$

So it can be certainly expressed that more than half of observation had negative response to the credit repayment question. Their reasons in previous parts were explained.

The results of the hypothesis are shown in the table below. As can be seen, every four hypotheses have been confirmed.

The results of hypothesis tests:

result	Significance level	coefficien t	Hypotheses under investigation	ردیف
confir med	0/1	-5/35	There is positive effect between interest rates and repayment of	1
confir med	0/05	+5/74	there is positive between repayment and borrowers' income	2
confir med	0/01	+3/01	there is significant relation between economic boom and repayment	3
confir med	0/1	-1/95	there is direct relation between customers 'validation and repayment	4

Conclusions and recommendations:

The present study investigate the effective factors on repayment of Melli banking credit in Kohgiloye and boyre ahmad. The obtained results of the first hypothesis suggest the inverse and significant relation between interest rates and repayment of banking credit. It means the high percentage of the interest rate of facilities granted to reduction of borrowers' abilities in repaying of credits. So the banks should make the interest rate facilities to the customers real one. Not only in the pursuit of profits and reduce the risk of non-repayment of credits to a minimum.

It is worth mentioning that the differences between interest rates in money market and unorganized money market are considered as reasons of banking credit defaults. Reduction of interest rates and appealing facilities more than past are the main reasons of deferred portion of bank debt. As a result, regarding the fact that the high and low interest rates are the main reasons of default, efforts should be made in making the granted interest rate of facilities real one. Until be hopeful to the reduction of default rates. Moreover, homogenization of facility rates in banking system as well as alternating it with inflation rate is another ways of default reduction. Regarding the second hypothesis, the results show the positive and significant impact between level of income and credit repayment.

It means, the more level of borrowers' income is, the less the default rates will be. The expected suggestions of this point can be explained way that the level of borrowers' income can greatly affect their abilities in repaying the credits. The more income is, the less default rates will be.

In this hypothesis the banks should have up to date system of their own customers containing clear information about borrowers abilities and Financial compliance in line of getting banking facilities. Bank experts push the facility to have a secure channel on the basis of the ability of policy in the field of lending without or with minimal risk and is.

Thus those people having higher and more secure income , they have higher potential in getting banking credit. Consequently lead to more efficient use of their facilities and cause the growth and economic prosperity of the country and cause increasing in repayment, on the other hand. Regarding the 3rd hypothesis, the results of this study show that when the economic boom increases the welfare of society and employment, he repayment rate of banking credits will be increased too. As a result, here is significant and direct relation between economic boom and repayment of banking facilities.

Regarding this point, it is clear that in bad economic conditions like inflation, downturn the value of national currency is reduced and supply and demand are not in balance and consequently, the revenues with expenses and costs are not homogeneous, the default rates will increased too. Also, it makes he banks face several problems. In this condition, one of the main solutions of avoiding overdue receivables is investigation of applicants' receiving facilities. Because most of suggested plans do not have economic justifications in downturn and inflation conditions. Basically, they are losing. If banking credit is injected with the plan, the probability of defaults will increase. And the banks provide conditions that Bank resources will lead o to productive sectors with economic feasibility.

The obtained results of 4th hypothesis show that there is direct relation between customers' validation and their repayments. And this hypothesis is confirmed. So the envisaged suggestion in this case is that the experts should have accurate measurement before granting facilities. And conduced principles and investigate their backgrounds and based on take action to pay .

Suggestions:

- 1-Since it has been case study and due to its hearty cooperation of institutes are needed. It has better their positive opinions regarding suggested research can be really helpful in pursuing the work.
- 2-Regarding wide field of the research, it is suggested that due to getting better results of the default rates and its reasons in smaller level like city areas, they should be investigated separately.

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