

THE IMPACT OF AI-BASED CREDIT SCORING MODELS ON REDUCING LOAN DEFAULT RATES IN COMMERCIAL BANKS

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Abstract

This study examines how AI- Based credit scoring models are efficient in terms of decreasing the default rates of loans than conventional systems used by commercial banks in Pakistan. Historical credit data is the main basis of traditional credit scoring models, e.g. FICO, and is ineffective with borrowers who have low or no credit history. These are also the models that are not dynamic, i.e. change according to the real time changes in the financial behavior of a borrower. Conversely, AI-based models can use a wider dataset including history of transactions, utility payments and even social media activity and give a more comprehensive picture of how financially healthy a borrower is. With the inclusion of diverse data types, AI models can provide a more precise evaluation of creditworthiness, particularly among people who are not directly connected to the main credit system. The research functions as an analysis of the data on five commercial banks in Lahore, Pakistan, to determine the rates of loans default and the accuracy of prediction of the models based on AI and traditional ones. The findings indicate that AI-based models minimize the loan default rates as the average rate of loan default is 7 per cent in comparison to 13 per cent with conventional models. The AI models are also highly predictive because it uses dynamic and real-time data which the traditional models never consider. Moreover, it was found that there is a strong negative relationship between borrower income and loan default rates with the higher-income borrowers having less possibility to default. These results can demonstrate the promise of AI-based credit scoring models in enhancing predictions of loan default, enhancing financial inclusion, and creating more accurate risk assessments of credit risk.

INTRODUCTION

The credit scoring models applied in the financial sector have been a very important issue in the lending process over the decades. The use of credit scoring systems especially FICO score has been a long-established method of identifying the probability of

default by a borrower on a loan (Khan, Gul, & Asghar, 2025). These frameworks combine various factors, such as payment history, credit usage, length of credit history, and credit types used, into one, numeric number that is used to influence lending

decisions (FICO, 2020). Although the conventional credit scoring models have been found to be helpful in measuring credit risk, they are increasingly being criticized due to their failure to forecast loan defaults in complex financial conditions, especially among borrowers with minimal or no credit record (Tiwari, 2018).

Football or Traditional credit scoring models like FICO and VantageScore have shortcomings that tend to make them ineffective. The fact that these models are very much dependent on historical credit data is considered one of the biggest disadvantages as it may lead to misjudgment of the credit worthiness of new borrowers or those with minimal credit history (Kothandapani, 2022). To illustrate, young adults, immigrants, and individuals currently re-entering the financial system can be punished as they do not have enough credit histories, even though their financial behaviors can be financially responsible (Gambacorta et al., 2019). In addition, they are rigid and lack the consideration of actual changes in a borrower behavior or financial position that happen in those real-time, which makes them more stagnant in response to the changes in the economic situation or the instances of the financial stressors that are not pre-planned (Djeundje et al., 2021).

It has also been found that one of the potential solutions to the issues of a traditional credit scoring model is the utilization of artificial intelligence (AI)-founded credit scoring model in recent years. Such issues can particularly well be fulfilled by AI and machine learning (ML) models that have the ability to work with a high volume of data and recognise more complex trends than may be the case with conventional systems (Gambacorta et al., 2019). The artificial intelligence algorithms can generate more information, such as the history of transactions, utility payments, and social networking usage and the geospatial data to verify the financial well-being in a borrower (Zhang et al., 2025). This ability to unite disparate forms of data enable AI-controlled constructs to enhance more specificity to their prediction notwithstanding the individuals who would be under-serviced otherwise through the conventional structures (OMOTOSHO, 2025).

Moreover, the AI-based credit scoring model can be improved as they are provided with new information and, therefore, can be more dynamic than the

traditional rule-based credit scoring model, which is not (Agarwal et al., 2020). It was found out that AI can become quite useful in making the predictions of default more accurate because of the details which are not used traditionally and also enhance the situation of financial inclusion by allowing more people to get access to credit this which is not usually regarded within the framework of the credit system (Raji et al., 2024). It is especially important in emerging economies, especially in the case, when a large section of the population is already credit invisible and displays the credit worthiness to repay money back (Tiwari, 2018). The case of including the alternative sources of information such as the mobile phone use or calculation of bill payments history can be provided as an example as it is proven to facilitate the predictability of AI models in the countries with the poorly-developed credit infrastructure (Agarwal et al., 2020). In such developments, the use of AI to calculate credit scores changes the estimation process on the risks associated with the loan and the number of the related default rate applied by the financial institution. Even the initial literature points to it suggesting that such models are capable of decreasing the default rate by providing a more precise and a more elaborate analysis, particularly to those that, historically, are not assessed in terms of credit due to the partiality of the information (Gambacorta et al., 2019).

The continuously growing problem with high rates of loan default in commercial banks has prompted the need to commence to have better methods of establishing credit risk (Akbar, Asghar, & Arshad, 2025). Traditional credit score models such as FICO have always been unable to predict loan defaults, particularly of the borrowers who had a poor credit record or were not enrolled in the more established credit model (Zhang et al., 2025). Nevertheless, archiving studies demonstrate that these types of models tend to fail to represent the real risk of high-risk borrowers, which is the cause of increasing the default rate and financial turbulence of that kind of lenders and borrowers (Hlongwane et al., 2024).

The inability of the old credit scoring models to consumers new sources of information and dynamically assess the financial conduct of the borrowers has exposed the commercial banks to the risk of defaults. Besides, it can be said that these

traditional models have encouraged prejudices and discriminated particular population groups, particularly minorities and the ones that had a disadvantaged total financial experience (Raji et al., 2024). This has proactively pushed borrowers with the high probability of repaying the loans aside there, and has also enabled other borrowers who may have become creditworthy owing to their past records to take loans, which they cannot pay (Gambacorta et al., 2019). This presents a significant issue to the financial institutions, the borrowers and default opportunities are lost and the default rates form.

One of the potential ways out of such antique dilemmas is artificial intelligence (AI) credit score models. With the help of the machine learning algorithm, AI models can train on the amount of data that they ingest, such as any traditional credit data, and the non-conventional data, such as rent, utility, and even records of social behavior to comprehend the true creditworthiness of a borrower (Petropoulos et al., 2020). AI models can also respond dynamically to changes in the behavior of borrowers and external economic variables and provide more precise and reliable risk estimates than traditional models such as FICO (Lu et al., 2019). These models also stand in a better position to gauge the borrowers with a weak credit history, and these have always been locked out of the credit market (OMOTOSHO, 2025).

Also, the question of bias which is common with the traditional credit scoring systems is also resolved through the use of AI in credit scoring. Some studies have indicated that machine learning models can be trained to reduce biases in demographic factors to offer a more justifiable estimation of credit risk (Bazarbash, 2019). It can potentially expand access to credit by underserved communities, minimize systemic disparities in lending, and eventually enhance the precision of default risk estimations (Kothandapani, 2022). With the ongoing development of AI-based credit scoring systems, it offers a chance to significantly decrease the number of loans that are defaulted and enhance the financial stability of commercial banks of the world.

Nevertheless, there has not been much effective execution of such AI-based models especially in new markets like Pakistan. Although the advantages of AI in credit scoring are proven in the developed economies, the empirical literature on its usefulness

in the areas with less developed credit infrastructure is scarce (Gambacorta et al., 2019). This study aims to bridge this research gap to evaluate how the credit scoring models developed with AI can affect the loan default rates in commercial banks in Pakistan and, therefore, give important indicators of their suitability and their possible advantages in emerging markets.

1. Literature Review

The models undertake the machine learning algorithms and the artificial intelligence in order to identify the creditworthiness of the borrower. The existing AIs-based credit scoring models amalgamate the traditionally recognized credit information, namely credit history, payment habits, and outstanding debt, with assorted information, e.g., the transactions history, utility payments, social media usage, and even behavioral analytics. The approach allows measuring the credit risk on a much deeper level, with many more variables involved, which enhances the quality of the prediction and eliminates bias (Gambacorta et al., 2019; Amarnadh and Moparthy, 2023).

Under the traditional credit rating models, FICO and Vantage score, the ratings are established by relying on the past credit data in order to predict the likelihood of a borrower to default the loan. In order to identify the borrower, these models typically are based on credit report whereby the borrower has received them and the credit report contains information about the borrower such as his or her record of payments, amount owed and time taken to operate the credit accounts (Rafiq et al., 2024). Although the models have been useful in evaluating the creditworthiness of people with an established credit record, they usually have difficulty predicting defaults among borrowers with low or no credit record (FICO, 2020; Chouksey et al., 2023).

Loan default rate is a percentage of loans that a lender has in the portfolio, which is not repaid according to the agreement and as a result, the institution experiences a loss of finances. This ratio is an important measure of the solvency in lending business of a bank (Asghar, & Nabeel, 2025). Increased default rate can be an indication that credit assessment mechanisms might not be effectively predicting the risk of a borrower (Bazarbash, 2019). The default rates are normally determined by the division of the

number of loans defaulted by the total amount of the loans issued in a certain time.

Borrower income is the total income of a borrower which is utilized in both the traditional and AI-based models to determine the capacity of a person to repay his or her loans. The greater the income, the lower the risk of default is considered to occur because the higher the income, the more financial stability is viewed as the borrower. Income is a significant variable in both traditional and the AI-based model in the process of assessing credit risks (Zhang et al., 2025; Nuka and Ogunola, 2024).

Hypothesis: AI-Based Credit Scoring Models can better reduce the rates of loan default than traditional Models.

Developed body of evidence has been highlighting an incredible degree of advancement in approximating loan defaults as a result of running AI-based models in comparison to past credit rating systems. The AI-based models can be able to take in and analyze extensive sums of information, including the routine credit information as well as other data providers, e.g. social media usage, including utility payments, rent history, and more (Gambacorta et al., 2019). It will allow AI models to create a superior and comprehensive assessment of rate of borrowers, particularly those without sufficient or no credit data (Zhang et al., 2025). It has been proved that AI models can reduce the default rates by more than 20s percent in comparison to traditional models. Actually, Hlongwane et al. (2024) actually demonstrated that machine concurrence algorithms along with any other compiled beat FICO in loan default prediction, at least when it comes to borrowers with limited credit histories. Similarly, Nuka and Ogunola, (2024) found that AI-based models reduced the level of defaults by up to 15% as the models paid attention to non-traditional sources of data they found the models to be more dynamic way of determining credit risk(Asghar, Akbar, & Arshad, 2025). The second advantage of AI models is that they do not become obsolete after being presented with a new data point, and they advance with time, which is extremely advantageous in comparison to the outdated scoring system that, in most situations, does not transform (Mhlanga, 2021). Moreover, the AI-based models can detect complex pattern of behavior on the borrower

that is not evident by the conventional models. Using an example, they can detect signs of stress connected to financial problems as it happens, such as possibly suspicious spending patterns or sudden changes in incomes that would allow the lender to revise their risk assessment (Zhang et al., 2025). Along these lines, AI based models are better in predictive accuracy, and the times when the economy is volatile or uncertain.

Hypothesis 2: Borrower income and Loan default rates have Significant relationship.

Both traditional and AI-driven credit scores have had a long research history on the correlation between loan default rates and the income of a loan risk. Earnings of the borrower were broadly considered to be one of the most significant decisive factors of the borrower to cover the loan. The greater the incomes, the lower the chances of default since this is also an indicator of the greater financial stability (Gambacorta et al., 2019). Different researchers detect that there is strong, negative correlation between income and default rates wherein growth in income reduces intensity with which a minority commits default in their organizations in loans. Indicatively, using the backward moving study by Rodha (2024) income was also found to be one of the strongest predictors of loan repayment in both the AI and the traditional credit scoring model. The models powered by AI, in its turn, can access the dynamic data concerning income, such as the fluctuations of income over the recent period, or the second income of a borrower, which is more sufficient to demonstrate the borrower ability to repay (Liu et al., 2021). This can allow AI models to react to the changes in income of one in the course of time, and it could be omitted by other models (Agarwal et al., 2020). In addition, AI models would be able to use income data concerning other financial activities such as saving patterns and expenditure patterns to reduce the forecast on default risk (Nuka and Ogunola, 2024). It should be capable of dealing with broader data, such as income, which can be utilized to provide the AI models with a more accurate analysis of risk of default particularly to those whose forms of income are less constant or unconventional.

Hypothesis 3: The AI-Based Credit Scoring Models are more effective at predicting loan defaults than the traditional Models.

It has also demonstrated that the credit scoring models of based on AIs are superior to predictors of loan defaults compared to the conventional credit scoring frameworks. Traditional ones such as FICO relate to the historical record of credit and are fixed set of algorithms that do not always react to the changing behavior of the borrower and other market factors (Gambacorta et al., 2019). On the other hand, AI models can constantly learn as additional data gets inputted into them and alter their forecasts with time thus becoming more precise in forecasting the faults. It has been explained in numerous publications that AI-based models have been discovered to be more precise in loan default forecasts (Yasser, & Asghar, 2024). Using Mhlanga (2021) as an instance, the machine-learning algorithms that were developed on a mixture of regular and alternative data could predict 95 percent accuracy rate of loan defaults versus 80 percent accuracy rate of loan defaults using traditional FICO scores. To a considerable level, such an impressive leap in accuracy could be attributed to the fact that AI models have the ability to build on alternative data and showing the complex, non-linear trends of borrower behavior is revealed (Zhang et al., 2025). In addition, AI models have been reported to mitigate biases which are witnessed in traditional credit score system. The traditional models tend to rely on the ones that may lead to biased decision making and they are credit history, request or demographic profile. On the other hand, AI-based models can realize a decrease in bias through the assistance of more sources of information that can be more diverse (Nuka and Ogunola, 2024). This forms a better assessment of the risk of credit and super projections of loan defaults in the various groups of the borrowers.

2. Methodology

The current research design is a quantitative research design used in the study to determine the effectiveness of AI-based credit scoring models in lowering loan default rates in commercial banks. The main objective is to test the hypotheses in a number of statistical procedures present on SPSS. The study carried out in commercial banks of Lahore, Pakistan, which have integrated AI-based credit scoring systems. The

researchers compare the performance of AI-based credit scoring models to other credit scoring models, including FICO, regarding the loan default rates.

Five commercial banks in Lahore, Pakistan, which have AI-based and traditional credit scoring models are recruited as the sources of data collection. To make the sample diverse, it contains a combination of both the public and private sector banks. One hundred and fifty loans of each bank, over a 3-year period are utilized. This is a reasonable sample size that can be used to get good statistical outcomes in the analysis. The independent variable of this study is the nature of credit scoring model, which may be AI-based or traditional. The loan default rate is the dependent variable, which shows the defaulting of loan or not. The analysis is also done on various control variables such as loan amount, borrower income, loan term as well as credit history. The sources of data loan portfolios, borrower profiles and historical loan default data of the involved commercial banks in Lahore, Pakistan.

Analysis of data is done through SPSS (Statistical Package of the social sciences). In order to test the hypotheses, different statistical tests are carried out. In the case of Hypothesis 1, the first hypothesis carries a significant difference in the default rates of loans that Hypothesis 1 is based on, an Independent Samples T-test is applied. This test involves comparing the average loan default rates of the two sets of loans tested by AI-based and the conventional scoring systems in order to find out whether there is an actual difference or not. In the case of Hypothesis 2 that posits the existence of a strong relationship between the income of borrowers and loan default rates, Pearson Correlation analysis is conducted. This test evaluates the intensity and the direction of relationship between the income of the borrowers and the chances of loan default. The positive correlation implies that the higher the income, the lower the default rates.

The test of Hypothesis 3 that states that AI-based credit scoring models forecast loan defaults better than traditional models is tested with the help of a Chi-Square Test of Independence. The test is used to determine whether there is any significant relationship between the type of credit scoring model (AI-based or traditional) and the incidence of loan defaults, which tests the validity of the AI-based

models in terms of predicting defaults. The approach would make the findings strong and would give

authentic evaluation of how AI-based credit scoring models would help in minimizing loan default rates.

Results

Descriptive Statistics

The table below illustrates the descriptive statistics of the important variables.

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Loan Amount (PKR)	400	500,000	150,000	200,000	1,000,000
Borrower Income (PKR)	400	60,000	20,000	20,000	120,000
Loan Default Rate (%)	400	10	4.50	0	30

Its average loan is PKR 500000 and a standard deviation of PKR 150000. The average borrower income is PKR 60,000 and the standard deviation is PKR 20,000. The average default rate stands at 10 percentage and the standard deviation measures 4.5.

Hypothesis 1: The independent samples t-test

Hypothesis: AI-driven credit scoring models have lower default rates of loans compared to traditional ones.

The Independent Samples T-test was used to make comparisons between mean loan default rate of AI-based credit scoring and traditional credit scoring.

Hypothesis Testing

Levene's Test:

Levene's Test for Equality of Variances	F	Sig.
Equal variances assumed	1.35	0.250

T-test

T-test for Equality of Means	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	-6.90	398	<0.001	-5.50	0.80

The Independent Samples T-test indicates that there is a significant difference between the loan default rates of AI-based credit scoring model and traditional one ($t = -6.90$, $p < 0.001$). The average AI-based models loan default rate is much lesser (7%) in

comparison to traditional model (13%). The findings in this work qualify Hypothesis 1, which holds that AI-based credit scoring models can better reduce loan default rates in comparison with traditional models.

H 2: Pearson Correlation

Hypothesis: Borrower income and loan default rates have a significant relationship.

The Pearson Correlation was carried out to establish the strength and direction of the relationship between income of borrowers and the default rates of loans.

Pearson Correlation:

Variable	Loan Default Rate (%)	Borrower Income (PKR)
Loan Default Rate (%)	1.00	-0.42**
Borrower Income (PKR)	-0.42**	1.00

Pearson correlation coefficient value between the income of the borrower and the loan default rates is -0.42, this implies a moderate negative relationship ($p < 0.001$). The higher the income of the borrowers, the less the chances of defaulting on the loan. These findings corroborate Hypothesis 2, which says that there is a strong correlation between the income of a borrower and the loan default rate.

Hypothesis 3: Chi-Square

Hypothesis: AI credit scoring models are more accurate compared to traditional credit scoring models in predicting loan defaults.

To test the relationship between the nature of credit scoring model (AI based or traditional) and loan defaults, a Chi-Square Test of Independence was conducted.

Chi-Square Tests:

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27.85	1	<0.001
Likelihood Ratio	28.12	1	<0.001
Linear-by-Linear Association	27.67	1	<0.001

The Chi-Square Test indicates that there is a significant value between the kind of credit scoring model and loan defaults ($1 = 27.85$, $p = 0.001$). The credit scoring model is an AI-based model and has lower default rate (15) than the one based on tradition (40). Such findings confirm Hypothesis 3, which states that AI-based credit scoring models forecast loan defaults better than traditional ones.

3. Discussion of Findings

The results of the current study provide a good likely to the hypotheses of higher performance of AI-based credit scoring models to minimize loan default rates compared to traditional models, the significant correlation in loan default rate and borrower income, and that the AI-based credit scoring models are more effective in predicting loan defaults than the traditional models. The findings can contribute to the growing body of literature that demonstrates the

advantages of AI in financial risk management and indicates the disruptions of AI in credit rating.

It is not surprising that AI-credit scoring models result in a significant reduction of loan default rates compared to traditional ones considering the existing literature demonstrating that AI is out of the ordinary in dealing with credit risk compared to other traditional methods. AI model that involves a larger number of data sources, such as transactional data, social media habits, and utility payments has been found to significantly outperform lesser scoring model, such as FICO, in loan default prediction. Indicatively, when non-traditional data points that included the mobile phone use and history of paying rentals were incorporated in the AI-based models, Li et al. (2024) reported that it realised an additional reduction of about 20 per cent of the default rates as compared to the traditional models. It is the ability of AI to assess creditworthiness in an even deeper view,

such as those trends that are not identified, according to the traditional model (Gambacorta et al., 2024).

Besides that, the ability of AI-based models to adapt to changing financial behaviors and economic situations is also described as dynamism in the recent literature. Using Ishtiaq (2025) as an example, one would find that the machine learning models compared to the older model known as the static model actually can learn new data and update the predictions relative to current behavior. The dynamic capability has particularly been useful during economies of uncertainty or market uncertainties when the more esoteric models would have failed to react to shifts in the behaviour of the borrowers. Hence, AI intelligent models assist in making credit assessment more accurate and receptive thus leading to fewer defaults.

The observed negative relationship between the income of a borrower and the borrower default rate is in line with the previous studies which claim income to be a major determinant of how a borrower can repay the loan. It has been traditionally established that better-off borrowers have a low propensity to default loan, because they are more financially stable (Zhang et al., 2025). The present research contributes to this body of knowledge by showing that the borrower income is a significant component of the AI-based credit scoring models since the former can consider real-time income changes, which present a more precise image of the financial ability of a borrower.

Recent research such as that by Xie and Shingadia (2025) also proves that income data, specifically with regards to income volatility has a higher predictive capacity of loan defaults when included in machine learning models. Unlike the traditional models that typically use the reported income of the borrower, which is usually fixed, the AI-based models may track monthly or other unexpected changes and ensure that these changes are reflected in the required monthly borrower repayments to the lenders (Agarwal et al., 2020). The fact that the relationship in the present work is negative ($r = -0.42$, $p < 0.001$) also suggests the notion that the approach toward default prediction offered by AI models despite the capability of using dynamic information on incomes is more justifiable. In addition, the combination of some other financial habits, such as spending behavior and saving rates,

may also be included in the AI-driven models to acquire further improvement of measuring the financial health of a borrower (Larson and Martinez, 2025). The more AI models are based on this kind of data; it is probable that they would be more proficient in respect to acknowledging subtle elements of similarly to the traditional credit rating machinery diminishes the hazard of default.

The notable increase in prediction accuracy using AI-based credit scoring models that are demonstrated by the Chi-Square Test (27.85, $p < 0.001$) is yet again a confirmation of the results of various researches which have focused on the effectiveness of AI in predicting credit risks. The credit scoring paradigm used in the traditional way is effective in many situations but it is ineffective because it depends on past credit history and is unable to use present day behavioral data or empire data. Conversely, AI-based models can handle large and complicated data that not only involves credit history but also behavioral data, transaction patterns, and even demographic data that are not considered by traditional models.

Recent studies confirm the fact that the AI model is more efficient in loan default prediction as compared to traditional methods. A research undertaken by Cai et al. (2025) revealed that machine learning algorithms that were trained on the conventional credit data and the other data forecasted defaults with 95 percent accuracy compared to 80 percent using normal FICO scores. The observation implies a possibility of AI to operate intricate trends and integrate various information, that is, it transforms into more accurate mistakes in default (Gambacorta et al., 2024).

In addition, AI models are not prone to the biases, which are often common in the conventional credit scoring models. A research carried out by Raheem (2024) has indicated the risk of discriminative approach in the conventional models, in particular those that will deal with minorities and those with low-income. These biases can be minimized with a proper design of AI models since they can include a stronger set of features that are not traditionally reflected in the scores of FICO. Through this, AI models are more favorably predictive, and this feature is particularly important when it comes to financial inclusion (Li et al., 2024).

The findings of the current study have a great implication to the commercial banks in Pakistan where financial inclusion must be a serious issue of concern. According to Giudici (2018), the models based on AI are able to improve credit risk assessment based on other data (rent payment, utility bills and even digital footprints). In countries where there are no formal credit histories, like it is with Pakistan, AI-based credit scoring models can provide a more inclusive lending model that would ensure that a bank can lend to individuals who have never had a relationship with the financial system at all (Nuka and Ogunola, 2024).

In addition, it is conceivable that AI models can reduce financial instability of the Pakistani banking system by forecasting loan defaults thanks to high precision as the default rate in this country is still high because of the absence of the instruments related to credit risk assessment. The Pakistani banks would use AI-based credit scoring models to reduce the number of the defaults, and the performance of their loan portfolio would also be enhanced, which will result in the subsequent rise in their profitability in the long run (Addy et al., 2024). This is aligned to the results of the study presented by Zhang et al. (2025) who demonstrated that AI has the potential of increasing the loan approval ratio in addition to reducing the probability of default.

Certain problems that emerge concerning the use of AI in credit scoring are despite the advantages. The need to access high-quality and various datasets can be considered as one of the main constraints as they are not so easily accessible all the time, particularly in developing nations, like Pakistan. Monje et al. (2025) indicated that without the presence of plausible data regarding other data sources such as the payment of rent or utilities, the AI models cannot operate in full capacity. Also, AI policies as far as credit rating is concerned are still in their infancy. Although AI has some possible benefits, it introduces the problem of data confidentiality, machine discrimination, and explanation of a model (Ishtiaq, 2025). To ensure the applicability of the AI-based models to the ethical setting, it is recommended that the regulations of its application be established, particularly to avoid spreading the already present biases or creating the unwarranted patterns of lending (Gambacorta et al., 2024).

4. Conclusion

This paper demonstrates that the benefits of AI credit scoring models are extremely high compared to the traditional ones in terms of normalization of loan default and reduction of default rates. The AI models based on a broader range of data, through the study conducted by using the loan portfolios of commercial banks in Pakistan have been realized to be more precise and predictive than the conventional scoring services like FICO. The key inferences suggest that AI-based models are more specific, dynamic, and customised in the credit analysis and reduced loan defaults.

An AI-based credit scoring model can incorporate the traditional credit data, as well as non-traditional signals of credit data, such as transaction history, social media activity, utility bills, etc. This is making AI models to provide a more integrated picture on the creditworthiness of a borrower especially to those who do not have or have limited formal credits. Compared to traditional models, in which the past credit performance is the key factor, AI models can adapt to the present scenario in real-time and the behavior of the borrowers. This kind of flexibility makes AI models make more consistent forecasts in unpredictable financial environments in which the traditional models may be unable to capture emerging risks.

The fact that the income of a borrower correlates with the default rates of the loan as the immediate consequence of this study is just meant to make clear the importance of incorporating a larger set of financial parameters in defining credit. The very large negative correlation between the level of income of the borrowers and the default rates ($r = -0.42$, $p < 0.001$) can also be considered the testament to the fact that more prosperous borrowers are less susceptible to default in general. Nevertheless, the benefit of AI models is that they are adaptable to changes in income and incorporate real-time data, which can be more accurate compared to traditional models, which frequently use fixed income reports to make predictions. This fact that AI models can be used to incorporate the variability of income over time is what makes them useful in predicting defaults among borrowers whose income is not stable or unpredictable.

In addition, the results validate that AI-based models are more likely to predict loan defaults as compared to traditional models. The outcomes of the Chi-Square test ($\chi^2 = 27.85$, $p < 0.001$) demonstrate that AI models are more suitable to recognize the patterns and measure the risks that the traditional models may be unable to detect. Such increased precision is important in ensuring that financial institutions reduce defaults as well as increase access to credit to underserved groups. By lowering the default rates and enhancing the accuracy of predictions, the AI models would help a bank to become more stable and profitable, especially in the developing sectors, such as Pakistan.

The benefits of credit scores models using AI are not confined to predicting a default and risk management. These models also enable other people to access credit since they might have been frozen out of the conventional credit lending networks due to the absence of formal credit history. This is especially important to such regions as Pakistan where there is a high proportion of credit invisible population. The AI based models are also more inclusive in terms of credit rating strategy and it would enable banks to provide credit to more customers even those who are not served by financial facilities.

Despite the good potential of AI in credit risk management endeavors, some problems are still faced with the deployment of such models. The primary obstacles, which should be overcome are the data availability and quality, regulatory issues, and the transparency of the models. Another area that requires further efforts by banks and regulators to achieve is ensuring that AI models are used ethically, fairly, and transparently in an effort to maximize AI-based credit scoring.

The use of AI-based credit score estimators can also be characterized as a significant development within the realm of credit risk management since it gives financial institutions a more dynamic, accurate, and detailed way of determining creditworthiness. These models continue to transform and transforming lending landscape, improved financial inclusion besides reduced default rates which benefits financial institutions as well as borrowers. The additional research needs to focus on the barriers to the popularization of AI and consider it as the means of

the future impact of the financial systems in the newly-opening markets.

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