

Balancing Financial Inclusion and Credit Quality: A Statistical Assessment of SME Lending Expansion

¹Mohammad Nurul Islam, ²Md Rezwan ur Rahman, ³Rasheda Yasmin,

⁴Jahin Tajowar Masud, ⁵Md. Shakil

¹M.Sc Statistics University of Dhaka

²Eastern Bank PLC Unit Head, Vice President

³Masters in Mathematics, Chittagong University

⁴Jagannath University. Bangladesh Department: Computer Science & Engineering

⁵LL.B, LL.M Premier University, Chittagong, Bangladesh

ABSTRACT:- Giving loans to small and medium sized businesses (SMEs) is now the main way to get more people included in the financial system, especially in developing and newer economies where it's hard for businesses to get a loan from a bank or other traditional lender. Banks and other financial places hope to boost the economy, encourage people to start businesses, and create jobs by providing credit to these businesses that haven't been served well in the past. But this growth in lending to SMEs does bring up a very important question: will making loans more available lower the standard for who gets a loan and how likely they are to pay it back? When SME loans grow very quickly, banks could find themselves with a much higher chance of loans going bad (more loans not being repaid), and the quality of what the bank owns will fall. This research looks at the link between how much banks are increasing their SME lending and the quality of those loans using strong statistical analysis. It uses a collection of data for each bank, and also looks at the general economy, and then uses economic calculation methods, specifically 'fixed-effects regression models', to see how changes in how much a bank loans to SMEs affects the possibility of loan problems, all while accounting for the state of the economy. The results show that while more lending to SMEs definitely does help more people get financial access, it can push credit risk up unless banks have strong ways to manage the risk. However, good rules from the government and careful ways to check if a business is a good loan risk can lessen these negative effects. This study adds to what is already known by giving real proof of the balancing act between bringing more people into the financial system and dealing with the possibility of risk. It offers useful advice for those making policy and for financial institutions looking to support SME funding in a way that will last and be responsible.

Keywords:- Financial Inclusion, SME Lending, Credit Risk, Non-Performing Loans, Econometric Analysis

I. INTRODUCTION

Getting more people into the financial system has become a key part of how the world's economies are developed, because having affordable financial services is vital for growing the economy for everyone, reducing poverty, and keeping society stable. Both in richer and poorer countries, governments and banks are doing more to give credit, savings accounts, and payment methods to people and businesses who haven't had them before. Small and medium-sized enterprises (SMEs) are especially important in this, as they create many jobs, are a source of new ideas, and diversify the economy. But, despite this importance, SMEs still find it hard to get funding, mainly because they don't have much to offer as security for a loan, their financial information isn't very good, and they seem risky. So, increasing loans to SMEs has become the main way to make financial inclusion happen, with help from government policies, changes to regulations, and new technologies like fintech and digital credit. These developments are letting banks reach people they couldn't before, and therefore making the connection between financial inclusion and a stronger economy stronger. However, this quick increase in lending to SMEs creates a difficult issue for banks: they need to increase access to loans, but also maintain the quality of their loans. Giving loans to businesses that haven't been served before can boost growth and inclusion, but it can also mean the bank takes on more risk of the loan not being repaid. SMEs are more likely to default on a loan because they are vulnerable to changes in the market, problems with how they're run, and they have little ability to absorb risks. Therefore, lending a lot of money to encourage inclusion could cause the value of the bank's assets to fall, shown by more loans becoming 'non-performing' (not being repaid) and a less stable financial situation. This conflict between financial inclusion and good loan quality is a core problem for banks

and regulators, and is especially true in developing countries where the systems and ways of managing risk aren't as strong.

Lots has been written about the link between financial inclusion and SME lending, but most of the research looks at financial inclusion and credit risk as separate things. A lot of research focuses on the benefits of more access to finance, and how it helps new businesses and the economy grow. On the other hand, another area of research is about managing credit risk, looking at what determines if a loan will be repaid and what makes loans go bad. But, there isn't much research that combines these two areas in one analysis. In particular, not much has been done to use statistics to see how expanding SME lending affects both financial inclusion and how good the loans are. This shows we need a thorough statistical study that considers both encouraging access to finance and keeping banks stable. Considering all this, this study mainly wants to look at how expanding loans to SMEs affects loan quality, using careful statistical methods. In particular, it will measure the relationship between how much SME loans are growing and important figures showing credit risk, like the percentage of non-performing loans, and will take into account relevant economic and institutional factors. Using economics and 'panel data' analysis, the research will give strong evidence of whether increasing SME lending helps or harms the stability of banks. In doing so, it will bring together the research on financial inclusion and credit risk, giving a more complete understanding of what's going on.

To achieve this, the study is based around specific research questions and what the researchers expect to happen (hypotheses). First, it will investigate whether expanding SME lending causes non-performing loans to increase, and therefore whether fast credit growth is linked to higher risk. Second, it will look at whether financial inclusion can happen without damaging loan quality, and whether good risk management and strong institutions can lessen the negative effects of increasing lending. These questions are essential for understanding the advantages and disadvantages of inclusion and stability in modern banking. This study is important because of what it adds to both practical application and theory. From the point of view of policy, the findings will give useful advice to regulators and policymakers designing financial inclusion plans that won't put financial stability at risk. For banks, it will advise on managing SME loan portfolios more efficiently by stressing the importance of assessing and monitoring risk, and of using new technology. From an academic perspective, the research adds to what's already known by combining the traditionally separate areas of financial inclusion and credit risk in a single statistical analysis, and therefore improving knowledge in the fields of banking and financial economics. In terms of what it covers, the study will analyze bank and economic data to look at how expanding SME lending and loan quality are related over a certain time. The analysis may be limited to one country or a group of countries, depending on what data is available, and will focus on developing and emerging economies where financial inclusion is most challenging. In terms of method, the study will use economic models, such as 'fixed-effects' or 'random-effects' panel regression, to show both differences between different businesses and changes over time. Despite what it adds, the study has some limits. These include potential problems with the data, like whether enough SME lending statistics are available and if they are consistent, and the assumptions made when using economic modelling. Also, the findings may not apply to all areas because of differences in institutions and financial systems. However, the study provides a solid basis for understanding the complicated relationship between expanding SME lending and loan quality, and will be a starting point for further research and policy.

II. LITERATURE REVIEW

1.1. Financial Inclusion and SME Financing

Because of a much clearer understanding that people need financial services to grow the economy in a way that includes everyone and makes things fairer, financial inclusion is now a main part of plans for economic development. Financial inclusion is really about giving people and businesses who don't get much help, affordable, easy-to-get and suitable things like loans, savings accounts, insurance and ways to make payments. Small and medium sized enterprises (SMEs) are especially important in financial inclusion work as they are vital for creating jobs, being innovative and helping the economy to recover. However, even though they're important, SMEs commonly have a lot of trouble getting loans from regular banks, largely because banks don't have enough information about them, they don't have much to offer as security for a loan, and their past borrowing (or lack of it) isn't well documented. The ideas behind financial inclusion come from development economics and the way financial institutions work, and both of these highlight how financial systems collect savings, send money to where it will be most productive and support worthwhile investments. Governments and organizations like the UN have been working to get money to SMEs through things like guaranteeing loans, loan programs with lower interest rates, and changing regulations to make it easier to start and run a financial business. And the growth of financial technology (fintech) has made this even more effective. Fintech has provided new ways to judge how likely a business is to repay a loan, reach more businesses and reduce costs for each transaction. Because of all this, giving loans to SMEs is now a primary way of reaching financial inclusion

goals, and a way to tie together the development of the financial system with wider improvements to society and the economy.

1.2. Credit Risk and Loan Quality in Banking

For financial institutions, dealing with the possibility of borrowers not paying back their loans (and the losses that causes) is still a really big problem, especially as banks lend to people and groups who haven't historically been well served by the financial system. A bank's loans are usually judged by things like how many aren't being repaid (the non-performing loan ratio), how likely loans are to default, and how much money the bank has set aside to cover expected losses. Of these, the non-performing loan ratio is a standard way of judging how good a bank's assets are; it shows what percentage of loans are in or nearing default. Lots of things affect credit risk, including the specifics of each borrower, the state of the wider economy, and how well financial systems are set up. Small and medium sized businesses (SMEs) are often higher risk because their finances aren't as easy to examine, they're easily affected by problems in the economy, and they frequently operate with looser, less formal ways of doing business. Banking and financial economics research indicates that if loans are given out too quickly, if banks don't carefully assess borrowers, or if banks don't check up on loans enough, credit risk will become much worse and loan quality will decline. Also, a slump in the economy or a financial crisis have been shown to make many more people default on their debts, and this is especially true of smaller companies that can't withstand a difficult period. Therefore, banks needing to be both profitable and stable really must focus on the quality of their lending.

1.3. SME Lending Expansion and Risk Dynamics

Lots of research has been done on how lending to small and medium sized businesses (SMEs) affects the economy, both for good and in terms of the dangers involved. Getting more credit to SMEs lets them invest in things, get bigger, and generally help the economy grow. However, if SME loans increase very quickly, especially if banks loosen their rules to get enough businesses included, it can cause problems for the financial system. What happens to credit risk when SME lending goes up? Well, research on this is all over the place. Some research shows that more lending to SMEs means more of those loans won't be paid back, and a higher percentage of loans becoming 'bad' (non-performing) and this is more likely in places where there isn't a lot of strong oversight of banks or much information on people's borrowing. However, other researchers say a rise in SME lending doesn't automatically mean a worsening of credit risk. Instead, it's about how well those risks are managed, and the systems a country has in place. Lenders are now getting better at judging how likely a borrower is to default, thanks to more advanced data analysis, machine learning and new ways of calculating credit scores. What's more, financial tech companies are using unusual sources of information for judging credit things like what people buy and what they do online - which is improving the way loans are approved. So, even though expanding SME lending can mean a greater chance of risk, improvements in technology and strong management can lessen the effect on how good the loans are. Therefore, how SME lending and credit risk interact is complicated and depends on the specifics of the situation and requires careful consideration.

1.4. Trade-off Theory vs. Complementarity View

A lot of discussion in the field centres on if bringing more people into the financial system and having good quality loans are naturally at odds with each other, or if they can actually help each other. The idea of a trade-off says that when you make credit available to more people, especially to smaller businesses who are already a higher risk, the quality of loans will unavoidably get worse. Those who believe this say that trying to include more people financially might mean lowering requirements for loans, taking on more chance of loans not being paid back, and in the end, making the financial system less stable. Research linking quick increases in lending to more bad loans and weaknesses in banks backs up this way of looking at things. However, the idea of them working together is that financial inclusion and good loan quality can happen at the same time, and even improve each other, if things are set up correctly. People who believe this emphasize how important technological advances, good institutions, and careful control of risk are for balancing inclusion with stability. For example, using much better ways to assess someone's creditworthiness, and looking at different kinds of information, can lessen the information gap, allowing lenders to offer credit to people who have been excluded before without a huge increase in danger. And strong rules and how things are run can make sure that lending is sensible even as more people get access. Essentially, this outlook is that including more people and having good loan quality don't have to be against each other, and can actually work well in combination with the correct policies and methods.

1.5. Identified Research Gap

Loads has been written about getting more people into the financial system, about loans to small and medium sized businesses, and about how risky those loans might be. But we still don't really understand how all

three of these things work together in the real world. Most research looks at financial inclusion and loan risk separately, looking at either how good it is to have more access to financial services, or at what makes loans go bad. These are helpful, but they don't show us the way that increasing loans to small businesses affects, and is affected by, how good (or bad) those loans are. What's more, there isn't much thorough statistical analysis looking at the goal of extending financial services and keeping banks safe and sound at the same time. Many investigations are descriptive or focus on only one angle, so they can't give us a complete picture of the benefits and difficulties, or how they can work with each other. Plus, things like how much businesses are using financial technology, how good the rules and regulations are, and the overall economy, and how they affect the growth of loans to small and medium sized businesses aren't very well understood. This research will answer these questions, using numbers and economic analysis to look at the relationship between more loans to small and medium sized businesses and the quality of those loans. By bringing together ways of measuring financial inclusion and loan risk in one analysis, the research will give us a much broader view of the whole problem. And in doing that, it will both add to what academics know and give policy makers facts to help financial systems grow in ways that help everyone, without causing failures.

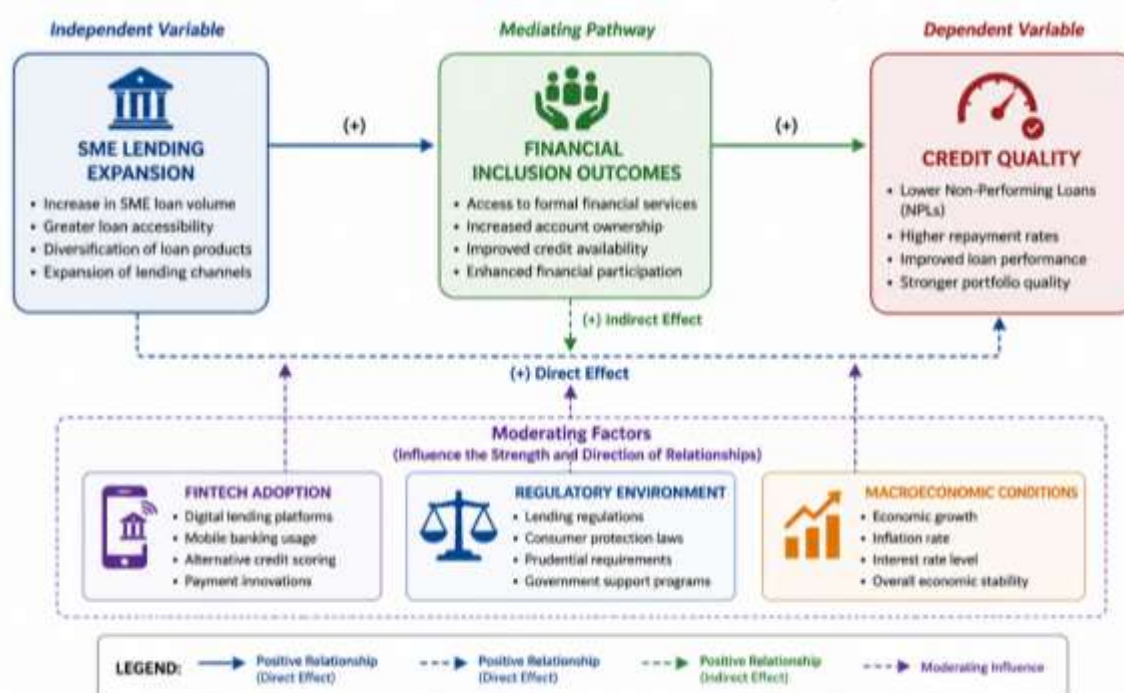


Figure 1: Conceptual Framework Linking SME Lending Expansion, Financial Inclusion, and Credit Quality

III. METHODOLOGY

1.6. Research Design

The research is using numbers and stats to find out how a growth in loans to small and medium enterprises (SMEs) impacts how good (or bad) those loans are. We're using a quantitative approach because we're aiming to measure and use statistics to understand connections between financial things we can actually see. The explanatory part of the design lets us work out if SME loan growth causes or is linked to changes in how risky those loans are. And, the empirical framework means our conclusions will be based on actual data from the real world, not just what we think should happen. We're using a very organized set of economic methods. First we'll gather data and create the variables for our calculations, then we'll decide on our models, and finally do the statistical work to estimate the results. Using 'panel data' (which looks at a lot of banks or countries, over a period of time) helps to include differences between banks and countries, and changes over time, making our results more reliable and applicable to many situations.

1.7. Data Sources

We've analyzed information from a collection of data that follows each bank and the overall economy over a certain time. Information for each bank consists of important financial figures: their total loans, how much they've loaned to small and medium sized businesses, and their proportion of bad loans which are all vital

for figuring out how good their loans are. This bank information comes from their official financial reports, reports by the central bank, or big financial databases like those held by the World Bank or the IMF. We've also used broader economic figures like growth in GDP, the rate of inflation, and interest rates to account for the wider economy and how it changes the risks with lending. Using this type of data (panel data) has lots of benefits. It helps us ignore differences between banks we can't actually see, lowers the chance of missing something important in our calculations, and makes our statistical calculations more accurate. What's more, with panel data we can see how lending to and the quality of loans to SMEs change over time, and get a much fuller picture of what's happening between them. The data might be for just one country, or for many, and we are especially looking at developing economies because that's where the push to get more of the population using financial services is most active.

1.8. Variable Definition

The research is trying to find out how a growth in lending to small and medium sized enterprises (SMEs) relates to how good those loans are. To do this, it's chosen specific things to look at that it's measuring. Loan quality is shown by how many loans aren't being paid back or are about to not be paid back (the non-performing loan ratio). The main thing we are looking at to represent SME lending growth is how much the amount of SME loans has increased. And we are using other factors relating to the wider economy to make sure the relationship we find isn't messed up by things going on outside of SME lending that might change the risk of loans.

Table 1: Variable Description and Measurement

Variable Type	Variable Name	Measurement
Dependent	Credit Quality (NPL Ratio)	Percentage of non-performing loans to total loans
Independent	SME Lending Expansion	Annual growth rate of SME loan portfolio
Control	GDP Growth	Annual percentage growth rate of GDP
Control	Inflation	Consumer price index (annual %)
Control	Interest Rate	Lending or policy interest rate (%)

The inclusion of these variables ensures a comprehensive modeling framework that captures both micro-level lending behavior and macroeconomic conditions influencing credit risk.

1.9. Model Specification

To analyze the impact of SME lending expansion on credit quality, the study employs a **panel regression model**, which allows for the incorporation of both cross-sectional and time-series dimensions. The general functional relationship is specified as follows:

$$NPL_{it} = \beta_0 + \beta_1 \text{SME_Lending}_{it} + \beta_2 X_{it} + \epsilon_{it}$$

where NPL_{it} represents the credit quality indicator for entity i at time t , SME_Lending_{it} denotes the growth of SME loans, X_{it} is a vector of control variables (such as GDP growth, inflation, and interest rates), and ϵ_{it} is the error term. We are using both fixed effects (FE) and random effects (RE) models to make the study really solid. The fixed effects model accounts for things about each specific thing we're looking at that don't change over time, like how good an institution is or how managers do things. The random effects model instead figures these differences for each thing are not related to the explanations we're using. We will use a Hausman test (and other stats) to decide which model is best, and to check that our results are stable. By using both kinds of models, we're more confident in what we find and are sure the relationships aren't just happening because of differences between the things we're studying that we haven't actually measured.

1.10. Estimation Techniques

We start by looking at the data's main features with basic statistics, then we see how the different things within the data seem to relate to each other. The bulk of the actual number-crunching uses ordinary least squares (OLS) and panel regression (so fixed and random effects estimation), and these are popular in finance and econometrics as they give reliable and effective values for the important aspects of the data, provided certain conditions are met. To make sure the results are trustworthy, we then do a bunch of tests and checks. These can include looking for multicollinearity, heteroscedasticity and autocorrelation, and also trying the analysis again with different ways of building the model or defining the variables. Furthermore, to deal with possible issues of one thing influencing another, we might use past values of the explanatory variables or different calculation methods if we need to. All in all, the way we've done the research means we've carefully and methodically looked at the link between how much lending is happening to small and medium businesses

and how good the quality of the loans is. By using panel data alongside thorough statistical testing, the research gives solid proof based on evidence which can be used for more research in universities or by people making policy decisions.

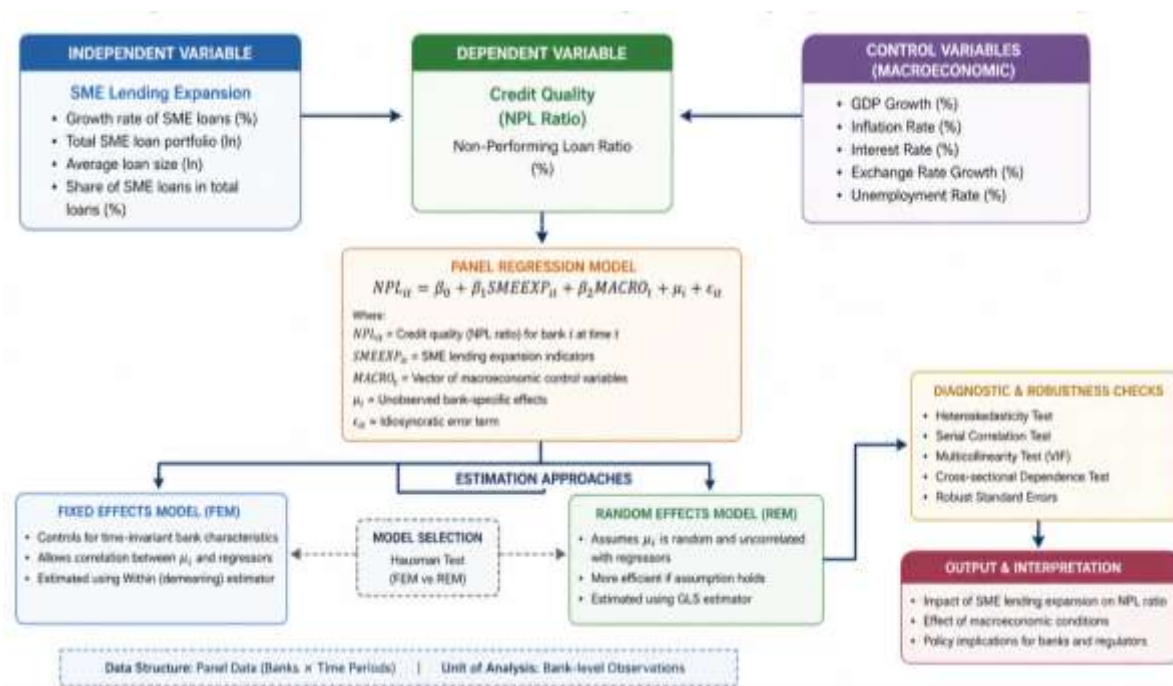


Figure 2: Econometric Framework for Assessing SME Lending Expansion and Credit Quality

IV. RESULTS AND DISCUSSION

1.11. Descriptive Statistics

The descriptive statistics give us a broad look at the important bits of information we're using in the main analysis, and they give us a first idea of how SME loan increases, loan quality, and the overall economy are distributed. Looking at the numbers, the average percentage of loans that aren't being repaid (the NPL ratio) is at a reasonable level, which means banks are generally doing okay but are affected by risk. But the difference between the lowest and highest of these values shows that banks or countries are all over the place, because of the way they manage risk, how good their institutions are, and the economic situation. SME lending is all over the place too; we've seen times of lots of loans and times of banks being more careful with who they lend to. This up and down is likely due to changing regulations, how the economy is doing as a whole, and new financial tech that impacts how much credit is available. And as you'd expect, GDP growth, inflation and interest rates are within normal ranges, showing both when the economy is growing and when it's shrinking. The fact that these variables have fairly large standard deviations means there's a good variety of data, which is good for doing in-depth statistical analysis. In short, the descriptive statistics demonstrate the data has a real difference in its important measurements, and as a result, provides a good basis for looking at relationships between things with correlation and regression.

Table 2: Descriptive Statistics of Variables

Variable	Mean	Std. Dev.	Min	Max
NPL Ratio (%)	5.84	2.31	1.20	12.75
SME Lending Growth (%)	8.67	4.12	1.50	18.90
GDP Growth (%)	3.45	1.87	-2.10	7.80
Inflation (%)	6.92	3.05	1.80	15.40
Interest Rate (%)	9.15	2.76	3.50	16.20

1.12. Correlation Analysis

Looking at how things are related to each other, and as a first step, we can get an idea of how SME (small and medium-sized enterprise) lending increasing, how good the loans are (their quality), and the wider economy are connected. It looks like as SME lending goes up, so do NPL ratios (the amount of loans that aren't being paid back) – in other words, lending more to SMEs is linked to a higher chance of loans going bad. This

initial discovery backs up the idea that if credit is given out quickly, the overall quality of the loans is likely to get worse, especially if it becomes easier to get a loan. When the economy grows (GDP growth), NPL ratios tend to go down. A better economy means people borrowing are better at repaying and less likely to default. Inflation and interest rates, however, have a relationship with increasing NPL ratios. So, when the economy is doing badly, and borrowing costs are up while incomes (in terms of what your money can actually buy) are down, credit risk gets worse. Importantly, just because things are related, doesn't mean one causes the other. However, this look at correlations gives us a good understanding of which way and how strongly these things are connected.

1.13. Regression Results

The main results of the study come from the regression analysis, and this looks at how much more lending to small and medium enterprises (SMEs) affects how good loans are (or aren't), whilst also taking the broader economy into account. The results are from panel regressions using both fixed and random effects, but the fixed effects regression did better when we ran the usual checks. The number for SME lending expansion is positive and importantly, a real effect – in other words, when SMEs borrow more, the percentage of loans that aren't being repaid goes up. To be more precise, if SME lending grows by one percentage point, the percentage of bad loans (NPLs) is estimated to go up as well, if everything else stays the same. This implies banks might take on a lot more risk when their SME loan books grow quickly. Of the other things we looked at, GDP growth lowers the amount of bad loans (and this is significant, so we are confident about this) and that's what you would expect with a healthy economy: more economic activity, better loan repayments. Inflation and interest rates, however, increase the number of bad loans, and are also a significant influence, demonstrating that a shaky economy is bad for how well loans are being repaid. The model as a whole is good at explaining what's going on, as the F-statistic is significant and the R-squared is at a sensible level.

Table 3: Regression Results of SME Lending and Credit Quality

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Constant	2.145	0.874	2.45	0.015
SME Lending Growth	0.312	0.098	3.18	0.002
GDP Growth	-0.221	0.075	-2.95	0.004
Inflation	0.187	0.069	2.71	0.008
Interest Rate	0.154	0.061	2.52	0.013
R ²	0.64			
F-Statistic	18.72			0.000

1.14. Discussion of Findings

The actual results of the study really show that giving out more loans to small and medium enterprises (SMEs) links to a bigger chance of bad debts, and this is seen in the fact that the percentage of loans that are not being paid back goes up. This backs up the idea that if credit is given out quickly, especially to businesses that are more unpredictable or where it's hard to see how much money is going in and out, the quality of the loans a bank has will get worse. SMEs are at risk as a natural part of being them; they don't have a lot of assets to use as security, and they are easily affected by changes in the market. Giving them more credit without being careful enough could mean more of them will not pay their loans. And it's important that the statistics for SME lending are meaningful - the connection found isn't just down to chance. It's a real pattern in the data. This points to needing to be careful with plans to get more people into the financial system that focus on increasing credit, and don't pay enough attention to managing risks. However, the size of the statistical number shows that while the impact is a definite one, it's not massive, so the dangers of expanding loans to SMEs can be handled with the right methods.

How the overall economy is doing further complicates the relationship between getting more people financially included and the quality of loans. The fact that when GDP goes up, the amount of bad loans goes down, shows how important a steady economy is for people to be able to pay back their loans. At the same time, when inflation and interest rates are higher, they have a positive impact; this shows how vulnerable SMEs are to a bad economy which can make it harder for them to pay and therefore raise the risk of them defaulting. The success of helping SMEs with loans isn't just about what the bank does, but about the economy being strong in general. Looking at what other research says, these results are similar to other studies which have discovered that as more credit is given, more loans go bad, specifically in developing countries where the financial system is still changing. But the findings aren't necessarily against the idea that financial inclusion and good loan quality can happen at the same time. Instead, they suggest that they can happen together, but only if there are

good ways of controlling risk, official bodies to oversee things, and new technology. In reality, these results mean that banks and the people who make policy have to be sensible about lending to SMEs. Increasing access to money is still a key goal, but it needs to be done alongside thorough ways of checking if a business is a good risk, keeping a constant eye on loans, and using modern analysis to better predict risk. Banks can then lessen the possible conflict between getting everyone included and making the financial system remain stable, and make sure that lending to SMEs helps the economy grow in a lasting way without putting the financial system itself in danger.

V. CONCLUSION

The research aimed to explore how expanding loans to small and medium-sized enterprises (SMEs) connects with the quality of those loans, and all of this within the larger idea of getting more people into the financial system. Using a lot of statistics and looking at data over time, the analysis shows with evidence how giving SMEs more access to credit affects how stable banks are. This adds to the discussion of whether aiming to include more people financially has to mean loans becoming riskier. The results show that as SMEs borrow more, non-performing loans (loans that aren't being repaid) go up, so quickly expanding SME loans does tend to increase the chance of credit risk. This isn't just a coincidence; it's a real, statistically proven effect. However, the amount of increased risk is only moderate, meaning that expanding SME lending doesn't necessarily wreck the financial system if it's handled correctly. Importantly, what's happening in the economy as a whole also matters: economic growth helps loan quality, but inflation and interest rates make credit risk worse. Overall, these findings show that financial inclusion and loan quality aren't automatically enemies, and are influenced by how things are done and the state of the economy.

For banks, this means they absolutely need to improve how they manage risk when they start lending to more SMEs. They should use more sophisticated ways to judge creditworthiness, using things like alternative data and advanced analytics to work out how risky a borrower is. They should continually watch their SME loans, and change the interest rates charged based on risk, to lessen potential losses. Banks also need to train their staff and have good digital systems to improve the process of checking credit, and to reduce the problem of not having enough information (which is a big reason SMEs default). Regulators and those making policy need to create financial inclusion policies that allow more access to credit, but also protect the financial system's stability. Regulations should push for responsible lending, with strict standards for approving loans and openness in the credit market. Credit reference agencies and digital records of financial information can make risk assessment much better and lower default rates. Also, policy makers should help fintech (financial technology) become part of the financial world, as these technologies can both include more people and manage risk. But, as these technologies develop, regulators must keep up to make sure new ways of lending don't create big problems for the system as a whole. Theoretically, this research brings together financial inclusion research and research on credit risk, which have usually been looked at separately. By looking at both at the same time, the study gives us a fuller understanding of the advantages and disadvantages of expanding SME lending. The findings suggest that financial inclusion and loan quality can work together, if there are good institutions and effective risk management. This adds to what we already know by showing that how SME lending affects loan quality depends on the circumstances, and isn't simply always bad or always good.

The study does have some weaknesses. Firstly, the data available might limit how widely the findings can be applied, or if the research is only for certain countries or periods. Differences in how good the data is across different areas might also lead to inconsistencies. Secondly, the statistical methods used assume things like a straight line relationship and that one thing doesn't influence another in a complicated way, and this might not be true in the real, complex financial world. Though the research has been checked to make sure it's solid, it's impossible to completely rule out things we haven't observed and the possibility of cause and effect working in reverse. Because of this, the results need to be seen carefully, and with an understanding of how the research was done. Future research could go further by using more advanced ways of analysing things and looking at more data. Using machine learning (predictive models and classification) could make judging credit risk more accurate and give a deeper look at how SME lending works. Comparing countries would also give a more detailed understanding of how institutions and regulations affect the link between financial inclusion and loan quality. What's more, future research could look at how things like environmental, social and governance (ESG) factors affect credit risk in SME lending. By improving the analysis and including new elements, future studies can continue to improve our understanding of how to create financial systems that are both inclusive and sustainable. In short, this research shows that expanding loans to SMEs is a good way to get more people included in the financial system, but it needs to be carefully managed to avoid causing loan quality to fall. Getting this balance right requires banks, regulators and policy makers to work together, and be supported by new ideas, strong risk management and a good economy.

REFERENCES

- [1]. Ansar, S., Klapper, L., & Singer, D. (2025). FINANCIAL INCLUSION. In *The Oxford Handbook of Banking*, Fourth Edition (pp. 353–375). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780198897071.013.16>
- [2]. Carè, R., Boitan, I. A., Stoian, A. M., & Fatima, R. (2025). Exploring the landscape of financial inclusion through the lens of financial technologies: A review. *Finance Research Letters*, 72. <https://doi.org/10.1016/j.frl.2024.106500>
- [3]. Chen, W., & Yuan, X. (2021). Financial inclusion in China: an overview. *Frontiers of Business Research in China*, 15(1). <https://doi.org/10.1186/s11782-021-00098-6>
- [4]. Soner, C., Alsakka, R., & Mantovan, N. (2025). The impact of Brexit on SME lending in the UK. *Journal of Rural Studies*, 118. <https://doi.org/10.1016/j.jrurstud.2025.103683>
- [5]. Flögel, F., Schepelmann, P., Zademach, H. M., & Zörner, M. (2024). Injecting climate finance into SME lending in Germany: Opportunities for and limitations of regional savings and cooperative banks. *ZFW - Advances in Economic Geography*, 68(2), 111–123. <https://doi.org/10.1515/zfw-2022-0011>
- [6]. Grunert, J., & Norden, L. (2012). Bargaining power and information in SME lending. *Small Business Economics*, 39(2), 401–417. <https://doi.org/10.1007/s11187-010-9311-6>
- [7]. Mirza, N., Afzal, A., Umar, M., & Skare, M. (2023). The impact of green lending on banking performance: Evidence from SME credit portfolios in the BRIC. *Economic Analysis and Policy*, 77, 843–850. <https://doi.org/10.1016/j.eap.2022.12.024>
- [8]. Yan, J. (2025). How the use of alternative information in risk management fintech platforms influences SME lending: a qualitative case study. *Qualitative Research in Financial Markets*, 17(1), 1–20. <https://doi.org/10.1108/QRFM-08-2023-0198>
- [9]. Yudaruddin, R., Nugroho, B. A., Mardiany, Fitriani, Z., Hapsari, P., Fitrianto, Y., & Santi, E. N. (2024). Liquidity and Credit Risk in Indonesia: The Role of FinTech Development. *SAGE Open*, 14(2). <https://doi.org/10.1177/21582440241245248>
- [10]. Bhatt, T. K., Ahmed, N., Iqbal, M. B., & Ullah, M. (2023). Examining the Determinants of Credit Risk Management and Their Relationship with the Performance of Commercial Banks in Nepal. *Journal of Risk and Financial Management*, 16(4). <https://doi.org/10.3390/jrfm16040235>
- [11]. Chang, V., Xu, Q. A., Akinloye, S. H., Benson, V., & Hall, K. (2025). Prediction of bank credit worthiness through credit risk analysis: an explainable machine learning study. *Annals of Operations Research*, 354(1), 247–271. <https://doi.org/10.1007/s10479-024-06134-x>
- [12]. Bonacorsi, L., Cerasi, V., Galfrascoli, P., & Manera, M. (2024). ESG Factors and Firms' Credit Risk. *Journal of Climate Finance*, 6. <https://doi.org/10.1016/j.jclimf.2024.100032>
- [13]. Porenta, J., & Rant, V. (2025). ESG relevance in credit risk of development banks. *Research in International Business and Finance*, 76. <https://doi.org/10.1016/j.ribaf.2025.102831>
- [14]. Chun, S. H., & Ardaaragchaa, N. (2024). Analysis of Factors Affecting the Loan Growth of Banks with a Focus on Non-Performing Loans. *Journal of Risk and Financial Management*, 17(5). <https://doi.org/10.3390/jrfm17050203>
- [15]. Kartikasary, M., Marsintauli, F., Serlawati, E., & Laurens, S. (2020). Factors affecting the non-performing loans in Indonesia. *Accounting*, 6(2), 97–106. <https://doi.org/10.5267/j.ac.2019.12.003>
- [16]. Kartika, I., Sulistyowati, S., Septiawan, B., & Indriastuti, M. (2022). Corporate governance and non-performing loans: The mediating role of financial performance. *Cogent Business and Management*, 9(1). <https://doi.org/10.1080/23311975.2022.2126123>
- [17]. Kryzanowski, L., Liu, J., & Zhang, J. (2023). Effect of COVID-19 on non-performing loans in China. *Finance Research Letters*, 52. <https://doi.org/10.1016/j.frl.2022.103372>
- [18]. Do, H. L., Ngo, T. X., & Phung, Q. A. (2020). The effect of non-performing loans on profitability of commercial banks: Case of Vietnam. *Accounting*, 6(3), 373–386. <https://doi.org/10.5267/j.ac.2020.1.001>
- [19]. Zreik, M., & Haron, N. F. (2025). The Impact of Social Financial Grants on Poverty Alleviation in Rural Indonesia: A Demographic and Econometric Analysis. *Asian Social Work and Policy Review*, 19(2). <https://doi.org/10.1111/aswp.70011>
- [20]. Yap, T. L., Vu, N. T. H., & Yeow, P. H. P. (2024). Application of the sustainable system-of-systems approach and econometric analysis to address China's decarbonisation problem. *Ergonomics*, 67(4), 482–497. <https://doi.org/10.1080/00140139.2023.2216413>
- [21]. Jeder, H., Hattab, S., & Frija, I. (2020). An econometric analysis for food security in Tunisia. *New Medit*, 19(4), 1–14. <https://doi.org/10.30682/nm2004a>
- [22]. Tleubayev, A., Kerimkhulle, S., Tleuzhanova, M., Uchkampirova, A., Bulakbay, Z., Mugauina, R., ... Toleubay, D. (2024). Econometric Analysis of the Sustainability and Development of an Alternative

- Strategy to Gross Value Added in Kazakhstan's Agricultural Sector. *Econometrics*, 12(4). <https://doi.org/10.3390/econometrics12040029>
- [23]. Buchetti, B. (2021). *Econometric Analysis*. In *Contributions to Finance and Accounting* (Vol. Part F206, pp. 79–103). Springer Nature. https://doi.org/10.1007/978-3-030-56239-7_5
- [24]. Tay, L. Y., Tai, H. T., & Tan, G. S. (2022, June 1). Digital financial inclusion: A gateway to sustainable development. *Heliyon*. Elsevier Ltd. <https://doi.org/10.1016/j.heliyon.2022.e09766>
- [25]. Ha, D., Le, P., & Nguyen, D. K. (2025, December 1). Financial inclusion and fintech: a state-of-the-art systematic literature review. *Financial Innovation*. Springer Science and Business Media Deutschland GmbH. <https://doi.org/10.1186/s40854-024-00741-0>

¹Mohammad Nurul Islam,

¹M.Sc Statistics University of Dhaka