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The American University in Cairo

School of Business

The Effect of Financial Inclusion on Banks' Credit Risk: Perspective from MENA Region

A Thesis Submitted to

Department of Management

in partial fulfillment of the requirements for
the degree of Master of Science in Finance

by

Rami Mohamed Farid Abdelmonem

under the supervision of Dr. Mohamed Bouaddi & Prof. Tarek Eldomiaty (co-supervisor)

May/ 2020

Deepest appreciation to my supervisors Dr. Mohamed Bouaddi and Prof. Tarek Eldomiaty for their undue efforts to support the thesis and myself,

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Dedications

May the divine be in my aid to employ all I have learned to benefit those in need and the underserved,

To Mama, Baba, Chadi, and Nermine, thank you for supporting me… you are my backbone and safe heaven… you are my refuge for love,

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Table of Abbreviations

SME	Small to Medium Size Enterprise
MENA	Middle East and North Africa
FINDEX	Financial Inclusion Database Index
NPLs	Non-performing Loans
GDP	Gross Domestic Product
IMF	International Monetary Fund
ROE	Return on Equity
EME	Emergent Market Economy
ML	Machine Learning
Fintech	Financial Technology
CRA	Credit Reporting Agencies
GPFI	Global Partnership on Financial Inclusion
MSME	Micro-Small and Medium Size Enterprise
EMNES	Euro-Mediterranean Network of Economic Studies
EPCGF	European Palestinian Credit Guarantee Fund
FATF	Financial Actions Task Force
LSDV	Least Square Dummy Variables
RESET	Regression Equation Error Test

Chapter One

Discovering the many Folds of Financial Inclusion

I.a Introduction

The recent literature has provided evidence on the groundbreaking role played by financial inclusion in enhancing the wellbeing of households and economic growth. This end is realized by enlarging access of the disadvantaged groups to basic financial services in the form of greater use of formal bank accounts, savings, and loans. However, the literature has overlooked the impact of the inclusive finance goal on the soundness of banks. In this respect, the suggested research aims at testing the relationship between financial inclusion and bank's credit risk, hence its stability. The findings in the literature suggest that banking stability is accomplished by availing financial services to households and Small to Medium Size Enterprise (SME's). The reason behind this is that it allows banks to diversify their credit portfolio, risk exposure, and reduction of non-performing loans (NPLs) specially when the borrowers are SMEs. Another positive feature is being a mechanism to lay down ample risk-free and cheap retail deposits. This could be employed as a leeway to decrease the reliance on volatile and often costly money market funding. An inclusive banking sector tends to have a higher level of cost and profit efficiency.

The rising voices demanding for more inclusive finance have remained persistent since the early 2000's, and are a consequence of empirical findings that financial inclusion efforts have positive effects on the alleviation of poverty in a country (Siddik & Kabiraj, 2018). In this respect, governments and central banks around the globe started to take initiatives and adopted new regulations to promote financial inclusion. Almost within the same time period, the recent global crises in 2007-2009 has compelled the world economies to embrace the concept of financial stability and emerge it as a policy priority (Siddik & Kabiraj, 2018).

Financial inclusion programs aim to provide greater opportunity of access for formal financial services to the marginalized sectors of the community, which in turn foster economic development of a country (Hannig & Jansen, 2010). In this light, focusing on the access and usage dimension of financial inclusion, the former has been described as a course of action which ensures, firstly, the access to the formal system and secondly, providing well-timed and

ample credit facilities to those in need for financial services including the weaker and the disadvantaged people of the country (Khan, 2011).

Building on the access and usage aspect of financial inclusion, despite the fact that the groundbreaking initiative can improve citizens' social standard, as given by the bank's capacity to lend under the umbrella of financial inclusion to fund SME's and individuals' small businesses. The research community has remained skeptical about the impact of financial inclusion on banks' credit risk and hence their stability.

Financial stability is conceptualized as the situation in which a financial system, consisting of financial markets, financial intermediaries, and market infrastructures is able to resist financial shocks, which are able to ruin the distribution of savings to lucrative investment alternatives. This would also mean, that financial stability is strongly allied to the risk diminution to the least intensity and resistance to shocks. Moreover, the concept of financial stability is likely to differ from developed to developing economies. In developed economies, financial stability is interpreted in the context of the state of non-financial institutions such as retirement funds, brokerage houses, investments funds, etc. Whereas in developing economies that comprise undeveloped stock markets, insurance companies, and investments into those countries mostly relying on bank loans. Henceforth, banks are the key pillars of financial stability and the gateway to economic stability (Popovska,2014).

I.b Objectives of the Study

Bearing in mind the virtues of financial inclusion and its ultimate goal in improving humanity's living standards. The goal that could be achieved by the delivery of financial services such as offerings loans to the underserved segment of the community, hence realizing suggested stability. Past contributions to the literature have overlooked the impact of introducing new customers to the official financial institutions by availing loans on banks' stability in specific and the entire national economy in general, making the outcomes yet ambiguous. In this regard, this study shall examine the impact of financial inclusion on banks credit risk in the Middle East and North Africa (MENA) region. In the light of having two opposing teams in the literature, the suggested research shall establish some answers to whether financial inclusion can positively or negatively impact the banks credit risk and hence stability.

I.c Contribution to the Literature

This thesis contributes to the current and relevant literature as follows:

1. Past literature has covered areas pertaining to the expansion of loans to clients and the case of imprudent loan extension impact on the quality of lending standards. Furthermore, it highlighted aspects of non-performing loans and how they vary in respect to the amount of loans provided to the end customers and banks' management. The relevant literature has also covered cases where credit has been extended under financial inclusion programs and how banking products' diversification can reduce risk, thus, resulting in stability. However, this thesis shall contribute to the literature by identifying the impact of and the relationship between the most relevant financial inclusion indicators extracted from the World Bank's Financial inclusion database (FINDEX) and the credit risk illustrated by the ratio of the provision of loan losses to net loans.
2. The thesis shall also inform financial regulators on how long till financial inclusion starts to take effect on credit risk.

Chapter Two

Financial Inclusion and Banks' Credit Risk: Review of Relevant Literature

II.a Conceptualizing Financial Inclusion in the Context of Previous Finance Theories

Financial inclusion can be understood in the context of the finance growth theory. It creates a conducive ground for productivity and hence economic growth. According to Spratt (2013), realizing economic growth depends on the level of financial inclusion, composition, and stability of the financial intuitions. The increased demand for financial services cause the financial markets to evolve from a nascent economy. Henceforth, deepening financial inclusion is an illustration of growth in other sectors of the economy and for financial institutions to support financial inclusion, they must be financial stable.

The effect of financial inclusion on bank credit risk has also been explained in context of Akerlof's financial asymmetry theory (1970). Boffondi and Gobbi (2003), perceive adverse selection to occur when a lender cannot differentiate between borrowers of different risks when loan contracts are limited. This leads to borrowers repaying loans when they have the mean to do so, triggering the accumulation of non-performing loans (Boffondi & Gobbi, 2003). Hanning and Jansen (2010) characterize financial inclusion by the entry of new, inexperienced and numerous customers into the formal financial sector including commercial banks. This creates an obstacle in the debt markets, as lenders have difficulties in deciding whether the customer is a good risk which menaces financial performance and hence stability. Therefore, it is challenging for banks to establish whether financial inclusion is a low risk good investment or otherwise (Hanning & Jansen, 2010). According to Richard (2011), moral hazard and adverse selection resulting from information asymmetry between borrowers and lenders can instigate contraction in credit and hence affecting performance and stability. Moral hazard occurs when a party to a transaction provides misleading information about its assets, liabilities or credit capacity. This is noted to be contributing to non-performing loans.

The theory by Diamond (1984) on financial intermediation has been deployed to establish a link between financial inclusion and bank credit risk. Diamond explains that banks act as intermediaries between borrowers and savers. As financial middlemen, banks avail access, financial diversification, and financial utilization. The degree of inclusion has an influence on the level of stability as substantiated by the literature. Diamond also points out that banks are able to effectively monitor borrowers and thus play the role of delegated monitoring. Reducing monitoring costs have significant impact on competitive advantage. Ndebbio (2004) regards financial intermediation as the extent to which financial institutions bring deficit spending units and surplus spending units together.

II.b Financial Inclusion Concept from Opponents to Advocates

The literature on the relationship between financial inclusion and banks' credit risk is scarce and presents mixed evidence. Some scholars have concluded a negative influence of financial inclusion on banks' riskiness, while other have reached results supporting the positivity of financial inclusion on banks' risk and stability. These mixed results incent researchers to further explore and reach robust answers on the nature of this relationship.

Commenting on aspects of banks' management, Espinoza and Prasad (2010) found that promoting size increase in loans can have a lagged effect on non-performing loans. This makes it difficult for bank managers to deal with the repercussions of credit risk in time (Espinoza & Prasad, 2010). Louzis, Vouldis and Metaxas (2012) have delivered a view of bank determinants. They concluded that non-performing loans are significantly promoted by the quality of bank management (Louzis et al., 2012). Gosh (2015) has referred to the strong relationship between the liquidity of risk, asset size, and cost efficiency of the banking sector and non-performing loans, which would be affected by social factors (Gosh,2015). Based on a study conducted in China, Guan, Zheng, HU, Fang and Ren (2017) analyzed the relationship between non-performing loans and the carbon intensity of loans according to China’s environment protection strategy and sought the results that prove that green credit would add to the credit risk of banks and hence increase non-performing loans (Guan et al., 2017)

In regards to availing credit and loan expansions, Khan (2011) has cited that financial inclusion can contribute negatively to financial stability. This can occur by attempting to expand the pool of borrowers that leads to the degradation of lending standards. It is worth to recall that this was

a major contributor to the severity of the “subprime” crisis in the United States (Khan,2011). Khan also argues that banks could increase their reputational risk if they outsource various functions as credit assessment in order to reach smaller borrowers. Moreover, if micro finance institutions are not properly regulated, an increase in lending by that group can dilute the overall effectiveness of regulation in the economy and intensify financial systems' risks (Khan, 2011).

Merhotra and Yetman (2015) argue that under the condition of high-paced and reckless credit expansion, higher financial inclusion leads to uncertainty for financial stability. This growth norm of unfettered parts of the country’s financial system may further weaken the stability of regulated financial systems (Merhotra & Yetman, 2015).

Sahay, Cihak, N'Diaye, Barajas, Mitram, Kyobe, Mooi and Youssefi (2015) observe a negative impact of financial inclusion on financial stability. The authors argue that with the lack of proper supervision, when credit is expanded to all, an increase in the risk of financial stability will be witnessed (Sahay et al., 2015). Furthermore, financial safeguards deteriorate when access to credit increases. They degrade more rapidly in countries with poor banking supervision. In contrast, states with strong supervision could observe the benefits of financial stability from this higher access to credit (Sahay et al, 2015).

Advocating for the concept of financial inclusion, Hanning and Jansen (2010) argue that low income groups are immune to economic cycles. Thus, including them in the financial sector will likely raise the stability of the deposit and loan basis. They invoke anecdotal evidence suggesting that financial institutions that serve customers on the lower end tend to endure macro-crisis and sustain the local economic activity (Hanning & Jansen, 2010).

Khan (2011) suggests that deciding to diversify banks' assets as a result of increased lending to smaller firms can decrease the overall riskiness of a bank loan’s portfolio. This means that the size of a single borrower will be reduced in the overall portfolio and reduce its volatility (Khan,2011).

Furthermore. Khan (2011) advances three core approaches through which financial inclusion can have a positive impact on financial stability. The first approach is by increasing the amount of credit to SME’s, banks can diversify their investment portfolio which in turn would reduce the overall riskiness of the banks. Secondly, financial inclusion means allowing the entry of more

small savers to the financial system. By inducting this segment to the financial sector, the deposit volume and its stability would rise and diminish the reliance on non-core financing, which has a deteriorating impact in times of financial catastrophe. This reflects in a decline of procyclical uncertainty. The third approach, is that financial inclusion may well reflect to an improved monetary policy through which financial stability goal could be achieved (Khan, 2011).

Han and Melecky (2013), use the data from 90 countries to examine the link between financial inclusion and financial stability. The authors have observed that financial inclusion measured by wider access and use of deposits, can build stronger banks' deposit base in the period of financial trauma. This will aid in the stability of a country's financial sector, especially middle income countries (Han & Melecky, 2013). Morgan and Pointes (2014), find that financial inclusion measured by proportion of credit provided to small and medium sized enterprises, enhances stability in the financial system (Morgan & Pointes, 2014).

In an effort to define more determinants of non-performing loans, researchers shifted their focus on factors from a macroeconomic perspective. In other words, referring to the regional economic development and the established economic theories. Beck, Jakubik and Piloiu (2015), deploy a number of national samples to analyze the influence of macroeconomic factors on non-performing loans, and found that real Gross Domestic Product (GDP) growth, stock prices, exchange rates, and interest rates greatly decrease the scale of non-performing loans, while the negative effect of the stock is stronger in developed countries (Beck et al., 2015).

II.c Non Performing Loans (NPLs)

Bhattarai (2015) in his study on the determinants of NPLs in Nepalese commercial banks, has cited that the real effective exchange rate has a strong positive impact on the NPL's level and that growth in real GDP had a reverse relationship with NPLs (Bhattarai, 2015). However, banks' size and inflation are not crucial determinants of NPLs. According to another study conducted in Greece, lending rates, real GDP growth rate, unemployment rate and public debt were considered as the explanatory variables that have an impact on the NPLs' levels (Bhattarai, 2015). Other banks' variables have an impact on the alteration of NPLs performance metrics as illustrated by return on equity (ROE), banks efficiency demonstrated by the ratio of operating expenses and operating income, and loans' categories (Bhattarai, 2015). NPLs are found to be determined by the GDP growth rate, real interest rates and lenient credit terms. The latter can create a herd

behavior and agency problems that may incent bank managers to allow excessive lending during boom periods. It is also being found that banks' lending policy could have a crucial influence on NPLs (Bhattarai, 2015).

Kjosevski and Petkovski (2017) has reported that measuring credit quality can be conducted using several indicators such as NPLs or defaults rates. However, NPLs has been used as a measure of credit quality as it has more popularity in the relative literature (Kjosevski & Petkovski, 2017). According to the International Monetary Fund (IMF), NPLs is the best indicator for showing the quality of loan portfolio. The authors believe that a slowdown in economic activity is likely to increase the growth of NPLs. They have also cited that a rapid growth of credit can detriment loan performance, due to soft-loan constraints and macroeconomic overheating. Higher concentration in banking usually accords higher NPLs.

In the context of procyclicality theory, a strong economic growth and decelerating NPLs ratio to picture loan quality portfolio could be interpreted as a sign of economic overheating, hence a potential threat to banking performance. The authors also allude to a study conducted on few Baltic states, which found that GDP growth has a significant determinant of NPLs. Furthermore, after the introduction of the real estate market growth rate as an explanatory variable, the former played an important role in Latvia and Lithuania.

The authors reference a study where NPLs varies due to a negative correlation with GDP growth in the Baltic states and Romania. The inflation rate exhibited a negative correlation with NPLs in all countries except Lithuania. The lending interest rate has demonstrated a positive correlation with NPLs in all countries except Romania. Likewise, for unemployment that has positively correlated with the NPLs in all countries. (Kjosevski & Petkovski, 2017)

Kumarasinghe (2017) has mentioned the relationship of banks losses due to credit risk as an effect of the evolution of the business cycle. The outcome confirms that banks' loan loss provisions and new bad debt are affected by the evolution of the business cycle (Kumarasinghe, 2017). In this respect, during economic boom, banks' loans increase rapidly and credit expansion decrease significantly in the depression cycle (Kumarasinghe, 2017). On the contrary, in times of depression, the banks are reluctant to extend credit for the end of investment, hence reducing the lending growth in the economy (Kumarasinghe, 2017). It is also found that when capital surplus over the regulatory minimum is low, banks are more inclined to reduce lending, negatively

affecting the output of the economy (Kumarasinghe, 2017). As previously demonstrated, NPLs lower level during boom is affected by high revenues of borrowers securing a stable cash flow to meet their loans obligations. The opposite side would be that the growth of NPLs in times of depression is caused by the fall in value of collaterals, hence incapable of covering the outstanding balance in case of default (Kumarasinghe, 2017).

II.d Financial inclusion credit risk

One of the goals of financial inclusion is to allow individuals and entities to acquire loans. However, with the propagation of loans as a mean of increasing the underserved segments influx into the official financial sector, the former is confronted with potential default levels, leading to the increase of Non-performing loans. This could be economically counter-productive, hence, compelling banks' management to control this risk. In this respect, this part is set to cover means in the past literature pertaining to decreasing the risk produced from loans acquisition under the umbrella of financial inclusion.

II.d.1 Micro Finance and Banking Practices to Control Credit Risk

Mckernan (2002), has cited the Grameen Bank model in lending to the underserved segment of the population. Microcredit programs approach poverty alleviation in a two-tiered approach, they deliver credit to the poor for the purchase of capital input with the end in mind to promote productive self-employment (McKernan, 2002). Moreover, they also provide non-credit services that are known as social development programs such as vocation trainings, civil responsibilities and rights, information in the area of health, and information sharing and monitoring among members. These non-credit services that distinguish group lending programs from banks or individual lending institutions, may be an element of success of micro-credit programs and thus a critical element to maintain when expanding and replicating programs (McKernan, 2002).

Godquin (2004) perceives a join liability through peer selection, monitoring, and pressure to enhance repayment rates' performance (Godquin, 2004). Besides, social ties and group homogeneity are also expected to increase repayment performance through a greater efficiency because of group dynamics (Godquin, 2004). The author believes that group homogeneity resulting from effective peer selection as a mean to increase peer monitoring should positively influence higher repayment rates (Godquin, 2004). High ties should have the same influence because they ease peer monitoring and increase social sanction of peer pressure. The author also

adds, that dynamic incentives and the employment of non-financial services, which are innovative microfinance not based on group lending, are also expected to increase repayment performance (Godquin, 2004). Dynamic incentives are said to be used when microfinance institutions increase the amount of lending to certain borrowers as credit is renewed, and condition the allocation of new loans to previous repayment behavior. Some microfinance programs are known as credit plus, as they provide services such as health services or adult literacy. It may also include other trainings that go beyond financial services (Godquin, 2004).

According to Ibtissem and Bouri (2013), moral hazard, adverse selection, small transaction sizes, amongst others, restrict the banking capacity to lend profitably to poor customers (Ibtissem & Bouri, 2013). The failure of commercial banking and the exclusion of poor borrowers, that originally one of the most important beneficiaries of the developmental purpose of financial inclusion, raise question on how poor people can improve their situation (Ibtissem & Bouri, 2013).

In this respect, the authors have reported in their publication several mechanisms that allow microfinance institutions to generate high repayment rates from borrowers without the need for collaterals and group lending contracts (Ibtissem & Bouri, 2013). The first mechanism is the threat of not to refinance a borrower who defaults on obligations. This will have a huge impact on the borrowers' behaviors as they consider future loans to develop their business. The credible threat to suspend future lending when loans are not satisfied, can be exploited to overcome information problems (Ibtissem & Bouri, 2013).

Another mechanism used to reduce lending risks and defaults is to establish a collateral substitute that could act as an emergency fund (Ibtissem & Bouri, 2013). Following the Grameen Bank model, many microfinance institutions, at the initial phase of their operations, require borrowers to pay extra 0.5% of every unit borrowed. This emergency fund functions as an insurance against loan default, death, or disability (Ibtissem & Bouri, 2013). Ibtissem and Bouri have also cited Bank Rakyat Indonesia that uses the borrower's degree certificate, driver's license, marriage certificate among others as collateral substitute (Ibtissem & Bouri, 2013). While in Russia, household items may be perceived as collaterals if they have sufficient personal value for borrowers (Ibtissem & Bouri, 2013). Moreover, in Albania, lenders may accept tangible assets like stocks as collaterals substitutes (Ibtissem & Bouri, 2013).

Among the other mechanisms that can sustain high repayment rates is the regular repayment schedule. Microfinance practioners believe that the discipline imposed by regular repayment maintains high repayment rates in the absence of collaterals (Ibtissem & Bouri, 2013). Moreover, it has been proven to have several advantages such as, screening out borrowers that are undisciplined at an early stage, and gives early warning for loan officers about future problems. It also allows the bank to control cash flows before consumption or diversion, and finally requires that the borrowers have a dependable additional income source as the repayment process begins before investment brings its fruit (Ibtissem & Bouri, 2013).

Microfinance institutions are likely to conduct non-financial products that are known as Business Development Services (BDS) (Ibtissem & Bouri, 2013). The provision of non-financial services as a complementary to credit and saving services works on improving the economic viability of the borrower to satisfy the debt. More importantly, it creates a valuable relationship between the former and the institutions. It has been found that the provision of non-financial services was positively correlated with repayment performance and may be the facet that guarantees the success of microcredit program (Ibtissem & Bouri, 2013).

Nemoto, Yoshino, Okubo, Inaba and Yanagisawa (2018) view that the default prediction is likely to improve when a model based on bank account information is used . If the utilization of the bank account information has been mainstreamed, banks will be able to reduce credit costs, review times and costs, and make loans to SMEs with greater efficiency. The reason for the potential success of such model, is that the bank account information cannot be manipulated nor altered by an information provider for the purposes of tax returns or loan applications. Hence the bank receiving the account information can examine the data even if the target company is a new customer. Hence, eliminating concerns regarding the credibility of the information and the personnel costs to scrutinize it, which deeply impact financial scoring loans. Employment of the bank account information model, allows banks to calculate the upper lending limit. By having a hand on the annual cash flow of the borrowers' account, a bank can estimate the realistic amount a borrower can repay. Based on this estimation, a bank can have better determination on the loan's amount. (Nemoto et al., 2018).

Bazarbash (2019) perceives that Emergent Market Economies (EMEs) are challenged by low financial inclusion and could really gain from financial technology (Fintech) lending. This end

could be realized by applying machine learning (ML) based credit rating that can bring about substantial consequences in the credit market in these economies. By improving credit analysis, Fintech lending can reduce the time of credit decision and generate lower loan rates to existing borrowers. Among the main financial constraints in EMEs that confines the growth pace of the financial sector, are the lengthy credit decisions and high loan rates. Banks and Fintech lenders benefit by appropriately pricing the risk. Hence, lowering the debt servicing cost for borrowers while enhancing their asset quality (Bazarbash, 2019).

Fintech can further assist in mainstreaming financial inclusion by lending to the underserved population relying on enhancing credit rating given that credit bureaus are either non-existent or poorly developed in EMEs. The asset quality of these borrowers will be lower than conventional borrowers. The fact that compel lenders to take more risk and should therefore offset the risk by holding sufficient buffer reserves and capital. Machine learning evaluation of credit risk should allow for measuring the amount of buffer (Bazarbash, 2019).

II.d.2 Institutional Answers to Control Credit Risk

Turner and Varghese (2010) paper on consumer credit information sharing, presents valuable means to control credit risk which is very applicable on financial inclusion case of extending loans for underserved segments of the community. The authors outline that the problem of asymmetric information in lending arises from the fact that a creditor knowledge of the borrower's potential to repay, that is, the risk profile, is vague and must be inferred based on available information. Hence one common result of information asymmetry is the misallocation of credit, as risk profiles are incorrectly assessed, where high risk borrowers confused for low risk ones and vice versa (Turner & Varghese, 2010).

Turner and Varghese has cited the work of Stiglitz and Weiss on the implications of information asymmetry that pointed out that in competitive equilibrium, credit market can witness rationing owing to insufficient information. Information asymmetry leads banks to rely on a combination of pricing (interest rates) and rationing to increase returns. However, high interest rates while covering the risk of borrower default result in adverse selection. That is higher interest rates attract borrowers seeking to make risky investments with potential for high rates of return (Turner & Varghese, 2010).

Stiglitz and Weiss view that the price mechanism on its own may not clear the loan markets due to the fact that, with interest rate increase to cover for high risk profiles, riskier applicants tend to be attracted. Furthermore, some borrowers are enticed to make riskier investments to cover for the price of credit. In addition, borrowers will be lured not to pay as in the absence of information sharing, they can still acquire loans from other lenders. Facing this moral hazard, which is the relative lack of penalty for non-payment, moreover the problem of adverse selection that stem from information asymmetry, lenders will have to ration credits. Credit rationing occurs when two individuals with identical risk preferences and profiles, one will receive a loan while the other would not (Turner & Varghese, 2010).

According to Turner and Varghese, credit bureaus are the institutional answer to the problems of information asymmetry and moral hazard in credit markets. Information sharing open a pathway to a lender to better assess the risk profile of a potential borrower and introduce incentives to have a borrower pay on time in the form of narrowing the former's future ability to access credit from other suppliers. In presenting information about potential borrower to a lender, Credit Reporting Agencies (CRA) play a crucial role in reducing informational asymmetry and moral hazard by allowing interest rates that are fine-tuned, or that reflect the risk of the individual borrower. This leads to adjust to lower interest rates for lower risk borrowers. CRA's also allow for a lower average interest rate, greater lending through reduced rationing, and lower rates of delinquency and default (Turner & Varghese, 2010).

Credit reporting regime has an impact on lending availability. The research suggests that full-file comprehensive credit reporting widens credit opportunities to the private sector than other credit reporting regimes such as negative-only reporting. Full-file comprehensive reporting results in better loan performance than segmented and negative-only reporting regime. Comprehensive credit reporting works on including non-financial data, the fact that increases access and improve performance compared to a system in which information sharing is restricted to the financial sector (Turner & Varghese, 2010).

According to the Global Partnership on Financial Inclusion (GPFI), the improvement of the infrastructure for SME finance should be tackled through enhancing the credit report system and enabling a better access to financial information by Micro, Small and Medium Enterprises (MSME). The GPFI has reported that in 1997 the Peruvian Superintendency of Banking has

conducted a series of overhauling that render the credit bureaus more effective in reducing the risk and costs of lending, especially to MSMEs. The two most important changes were the introduction of all loans, not just large loans, in the required information and the extension of coverage to a range of nonbank entities (municipal banks, rural banks, and micro and SME development lenders. The other improvement entailed the disclosure of this information to private credit bureaus and the inclusion of a wider range of debt. Moreover, overhauling of the credit report system has taken into consideration the inclusion of positive as well as negative information (GPFI, 2014). For MSMEs, this means lower costs and better risk management. As per the GPFI, these changes have instigated higher competition and has decreased interest rates (GPFI, 2014).

The Euro Mediterranean Network of Economic Studies (EMNES) (2018) on financial development and inclusion in Egypt, Jordan, Morocco, and Tunisia has cited Credit Guarantee Company's (CGC) as a tool to enhance access to finance, which is the main pillar to economic development achieved by supporting MSMEs seeking funding. CGCs provide guarantees to MSMEs without collaterals, or with inadequate collateral and track records to seek financing opportunity without the necessity of a guarantee. Moreover, CGC works on covering percentage of the risk pertaining to enterprises besides its provision of guarantee to the MSMEs (Euro-Mediterranean Network of Economic Studies, 2018).

CGC is likely to play a crucial role to remedy the status distinguishing the economies in transition from other economies, is that the financing gap can be extremely pronounced for factors such as, the lack of usable collaterals. This is in addition to the narrow range of assets that can be collateralized compared to more developed economies. In emerging economies, banks act as the only viable source of external financing. This is because in emergent economies, most of capital providers are capital importers, with a significant part of foreign capital inflows is arriving from the foreign direct investment or intercompany loans. These types of funds are likely not to be available for SMEs. In addition to this, the information gap between SMEs and the non-resident capital providers is huge, this as the capital owner lacks knowledge of the local situation that is indispensable for funding small companies (Euro-Mediterranean Network of Economic Studies, 2018).

CGCs are likely to be important in times of economic and cyclical setbacks. In times of increasing volatility, the financing gap for SMEs are likely to widen. The reasons for credit decline in times of financial stress, is the degraded capital of banks and liquidity positions that decreases the supply of credit in general across the economy. The high uncertainty that positively impact moral hazard and adverse selection that come as a natural element in SMEs lending. The matter that encourages banks to limit credit provision to SMEs. Other reasons may include the declining value of collateralized lending as the values of several collateral decrease in time of financial distress. Moreover, other sources of external financing such as trade credit dwindles just the same. In this respect, the demand for credit is likely to decline as well in time of economic downturns. In practice, it is observed that authorities in various countries responded to post-crisis slowdowns by offering large-scale guarantee programs for SMEs (Euro-Mediterranean Network of Economic Studies, 2018).

However, the European Investment Fund has identified key constraints for the use of credit guarantee. The most important constraint is the lack of credit demand by SME's. This in turn will impact on the demand for CGC, as the former's credit activity is conditional on the demand for loan. This is likely to occur for purely economic aspects such as SME's business plans or profitability measures, or other hurdles such as the lack of collateral or high borrowing costs. Another issue hampering CGC's from realizing their goals, is the eligibility problem. Guarantee products are accessible only to a narrow range of clients and the product parameters exclude potential clients that do not fit into the specific criteria. The administrative procedures related to credit guarantee is a key factor that hinders the use of credit guarantee. The cost assigned to guarantee products are among the most crucial impediments that discourage SME's to use this benefit for their own sake. This is likely to heavily persist especially when the banks have done their part of the deal to facilitate access to credit by lowering interest rates (EBCI-Vienna Initiative, 2014).

II.d.3 Monetary Policy Answers to Control Credit Risk

Shedding light on the relationship between bank capital and liquidity creation, some contributions perceive that bank capital may hamper liquidity creation by making the bank's capital structure less fragile. A bank occupying this status is likely to be committed to monitor its borrowers, allowing it to extend loans. Additional equity capital hinders the less fragile bank to commit to monitoring, which in turns impede the bank's ability to create liquidity (Berger &

Bouwman, 2009). Furthermore, capital may reduce liquidity creation because it crowds out deposits. According to Berger and Bouwman (2009) this is known as financial fragility-crowding out hypothesis (Berger & Bouwman, 2009).

In this respect, a counter argument pertaining to banks as risk transformers is being provided. Higher capital improves banks' ability to absorb risk, herein their ability to create liquidity. The creation of liquidity makes banks more prone to risks. The greater the liquidity being created, the higher the likelihood and severity of losses associated with having to get rid of illiquid assets to satisfy customers' demand for liquidity. Capital absorb risks and expands the banks' risk-bearing capacity, thus, higher capital ratios allow banks to create more liquidity. These set of theories are referred to as risk absorption hypothesis. In this light, these predictions are only the product of these theories combined rather that separated (Berger & Bouwman, 2009)

According to the World Bank report on enabling an environment for financial inclusion in the MENA region, deficiencies are found in the financial infrastructures and regulations that enforce it. This makes the increasing access to finance much costly and risky for banks. Lenders have to depend on collaterals that require hefty costs to register and credit assessments and risk management techniques that became obsolete. As per the report, the slight improvement of credit information quality and availability, moreover, the increasing efficiency of credit registries and the establishment of credit bureaus is not being accessed by microfinance institutions nor reported to them (Pearce, 2011).

The report which was published back in 2011, has reported that interest rate flexibility is being constrained. More than 6 MENA countries have placed caps on interest rates. Furthermore, most countries in the MENA region use disclosure requirements rather than usury ceilings in practice with the end in mind to guaranty the transparency of interest rates. However, it would have been much of a transparent approach to remove interest rate caps and instead strengthen consumer protection against exploitative practices such as excessive fees on overdraft and lack of consumer redress and miss-selling of financial products (Pearce, 2011).

For financial inclusion to thrive, financial infrastructure requires an overhauling. Moral hazard and adverse selection decrease when the collateral framework and the credit information system are ameliorated. Loans can be offered at a lowered cost and risk to clients that would have been previously excluded. Financial inclusion booming is conditioned by the enforcement of

transaction laws, unified collateral registries to ease the process for lenders to use the former as guarantees. Only by then, micro entrepreneur will be hindered to leverage current assets into access to finance (Pearce, 2011).

Ghenemi, Chaibi, and Omri (2017) in their study about the effect of liquidity and credit risk on bank stability covering the MENA region, have cited the work of Dermine (1986) that liquidity risk is seen as a profit lowering cost. A loan default would work on increasing liquidity risk due to the lowered cash inflows and the depreciation it causes. According to the theory of financial intermediation and the industrial organization approach to banking, there is a relationship between liquidity and credit risk. Moreover, risky banks assets generate bank shocks. Hence, we can reach the conclusion that liquidity and credit risk are positively related and together they contribute to banking instability (Ghenemi et al. 2017).

According to the authors, in the case of increasing number of economic projects that are funded with loans, the bank will face difficulties to meet the demand of depositors. Herein, these depositors will claim back their money if the value of assets have deteriorated. This means that credit and liquidity risk increase back to back (Ghenemi et al. 2017).

Banks' default risk is primarily driven by low capitalization and earnings, over exposure to certain categories of loans and extreme loan defaults. Moreover, banks should be regulated on the assets side instead of that of the capital. Banks should hold more liquid assets that would allow them to face liquidity risk and manage and monitor risks to which they are exposed (Ghenemi et al. 2017).

Awad and Eid (2018) clarifies in their study in an effort to analyze the weight of economic benefit of financial access against the effect on risk profile of bank and non-bank lending. The redistribution of credit towards new borrowers' segments comes with a cost at the account of financial intermediation efficiency illustrated in higher screening and information costs. In addition to changes in the risk profiles of bank lending as they issue loans to novel borrowers that are perceived as riskier clients. In other words, if the expansion of credit is not well managed, and if combined with low capitalization, can lead to financial crises (Awad & Eid, 2018).

According to the authors, financial inclusion can improve firms' access to credit and assist financial institutions in diversifying their loan portfolios. In this respect, extending loans to firms that were previously excluded may decrease the average credit risk of loan portfolios. However, increasing financial inclusion is not a safety valve for financial stability. If financial inclusion is coupled with a huge appetite for credit growth, financial risk may rise. Financial inclusion can be disseminated by involving the poor who were previously underserved, by availing credit for him or her. Nevertheless, paying no attention to their ability to repay the loan can compromise on the humane purpose of financial inclusion. As a result, this can degrade the lending standards. Moreover, financially excluded households by nature, lack historical records which are prevalent where personal identification systems are weak. Besides, there are bounds to speed limits to banks' ability to absorb a new customer without seeing deterioration in credit quality, owing to limits in screening capacity. The authors also added that an increase in financial inclusion, leads to fast paced structural change that compels central banks to retain sufficient capacity to monitor and react to any system-wide risks that could develop (Awad & Eid, 2018).

Awad and Eid (2018) has cited the work of Čihák, Mare, & Melecky on studying the nexus between financial inclusion and stability as two policy objectives and estimating the association between both. The results have concluded that on average, financial inclusion and financial stability are negatively correlated and hence linked more through trade-offs than synergies. According to the cited authors, the inclusion-stability nexus is most influenced by financial openness, fiscal freedom, education, and the depth of the credit information system. While financial openness stimulates trade-offs between inclusion and stability, fiscal freedom, education and credit information depth generate synergies between the targeted variables. Hence, if financial policy aims to push for individual financial inclusion, complementary policies to deepen credit information system could help mitigate the estimated trade-offs with financial stability (Awad & Eid, 2018).

Another vital point, is that people using financial services should be capable financially. This is perceived to be a major challenge in country having low GDP levels and higher level of poverty. Herein, governments shall not advance the virtues of financial inclusion services to high poverty segments of the community without basic level of education that aid in instigating the

beneficiaries' awareness about different financial institutions furnishing different financial services (Awad & Eid, 2018).

According to Castellanos, Henrnandez, Mahajan, and Sierra (2019), based on an experiment conducted to answer whether banks can use contract terms to moderate borrower risks. In other words, whether altering contract terms can stimulate change in borrowers' behavior. While the experiment has been developed in the realm of the Mexico's banking industry, the study has found that providing credit cards to "new to banks" borrowers, results in substantial risk, with 44% of the experiment's control group has exited the bank over the 27 months of the experiment. A proxy for net banks revenues has been constructed and found that the average net present value of the 27 month experience net revenue per account is 623 pesos while the standard deviation is 2580 pesos. Using a wide range of observables, we can explain that less than 5% of the variation in card default, exit, and profits. Together these two facts signify that lending to new to bank borrowers is risky and that it is hard to predict at the time the card is issued (Castellanos et al. 2019).

To answer whether banks can use contract terms to mitigate the risk, the study has proven that large changes in annual interest rates have limited effect on card debt and default for new to banks borrowers. The correlation between default and the interest rate (or loan size) is interpreted as a measure of moral hazard. As for minimum payment alteration, it has similar effect to those of the interest rate changes (Castellanos et al. 2019).

The same study has resolved to the fact that, while 28% of new to banks borrowers do not default on their first year, they get a second credit card issued by a different bank in the same year compared to only 2% of clients defaulting on their first year. This process is known as "poaching" of clients, may disincentive banks to lend customers with no credit history. In this light, poaching can hinder financial inclusion, seeing that banks are aware that new to banks borrowers who establish favorable credit history have tendency to be poached by other banks (Castellanos et al. 2019).

According to Castellanos, Henrnandez, Mahajan, and Sierra (2019), based on experimental results to reduce default levels by altering two key elements of the credit card contract, namely, interest rates and minimum payments. The authors have concluded that by lowering the interest rates from 45% to 15%, the default levels have decreased by 2.6 percentage points on a based

rate of 19% over a period of 26 months. The study also found a positive correlation between default and interest rates which is interpreted as a measure of moral hazard (Castellanos et al. 2019).

While some policymakers are concerned that lowering minimum payment could result in excessive borrowing hence increasing defaulting potential. This could have a drastic impact for both borrowers and the financial institutions. In this respect, policy makers have advocated to raise minimum payments. According to Castellanos and others (2019), increasing the minimum payments can have two opposing effects that are not clear which one shall have dominance. On one hand, it could reduce debt facilitating the repayment burden, thereby decreasing the default level. On the other hand, it could tighten short run liquidity constraints, which increases the default level (Castellanos et al. 2019).

In an effort to extricate the dual effect of raising the minimum payment, the study has resulted to having the second effect (tightening liquidity constraints) was no longer operational as all subjects were returned to common minimum payment of 4%, 3 years after the termination of the experiment. However, debt is lower at the end of the experiment in the higher minimum payment arms, thus, the repayment burden is respectively lowered. Moreover, during the experiment, both effects of raising the minimum payment cancelled each other out, emphasizing the double-edged nature of increasing minimum payment as policy tool to limit default (Castellanos et al. 2019).

In an attempt to investigate the relationship between financial inclusion and circumstances monetary policy and economic fundamentals. Yin, Xu, Chen, and Peng's (2019) empirical results show that monetary policy has a short term positive impact on financial inclusion factors meanwhile economic fundamentals has the opposite. In other words, positive monetary policy promotes the development of financial inclusion in the short term and sudden change of the economic situation will make it harder (Yin et al., 2019).

Shihadeh, Gamage and Hannoon (2019) have resolved that enhancing credit to SMEs would decrease the value of the non-performing loans in banks operating in Palestine. The study has also covered SMEs applying to the European Palestinian Credit Guarantee Fund (EPCGF) that encourages banks to extend more credit to SME's at a minimum level of risk. In addition, to allowing more source of financing to SMEs, banks can become more involved in other activities related to SME's by providing training and financial management, and investing in technologies.

In this light, convincing banks to invest in SME through providing credit could have a positive outcome on the former's performance (Shihadeh et al., 2019).

Lopez and Winkler (2019) have approached financial inclusion and credit risk away from the usual angle of having more inclusive banking sectors experiencing less crisis. However, given a crisis, a higher level of financial inclusion or a stronger development in financial inclusion in the times preceding the crisis, produces a benefit in the form of a less pronounced drop in credit growth, controlling for the size of the pre-crisis credit boom. Moreover, the authors test whether financial inclusion is a subject of boom-bust pattern. Meaning, whether a stronger borrower growth in pre-crisis period is linked to a steeper fall in borrower growth in a crisis. The results have supported that more inclusive banking sectors are likely to record decreases in credit and borrower growth in times of crisis. The study has also found that higher borrower growth rates in times preceding the crisis are not related to the depth of the credit bust following a crisis. This is to conclude, that countries are likely to gain from increasing levels of financial inclusion by recording less pronounced bust in credit and borrower growth. This is to concur that higher levels of financial inclusion make financial systems more resilient in times of crises. Nonetheless, the rapid development of financial inclusion has no mitigating effect on credit developments in a crisis, given pre-crisis credit development (Lopez & Adalbert, 2019).

II.e Improving Economic Stability by Increasing Access to Financial Institutions

Financial inclusion shall not exclude customers lacking track records to be allowed to acquire loans and employ this debt for a better quality of life. However, financial inclusion has been gaining much more significance and popularity by international organizations and leading developmental financial institutions for allowing people into the formal economy by depositing and saving money in banks. This humane product should be sponsored by governments by furnishing policies capable of lessening the conventional hurdles that hamper the citizens' ability to open bank accounts. Moreover, the governments should work on enhancing citizens' trust into the official economy represented by the banks and other financial institutions. This increased access into banks that is going to act in its turn to secure regular cash flow will have a positive impact on the economy as a whole. Besides, it will serve the usual setback committed by financial inclusion illustrated in the increasing lending risk. In other words, the increasing cash flows as a product of savings and deposits account could assist the banks in providing for the

risks caused by financial risks. This is to say, that increasing bank access leads to higher liquidity which could enhance the banks reserves to cover lending risks or NPLs.

Gatev, Schuermann, and Strahan (2005) have cited the explanation of banks' structure by arguing that pooling funds in intermediary agents can guarantee against liquidity shocks while still investing most of their funds in high return but illiquid projects. This structure advances the potential of self-sustaining banks and a policy for deposit insurance. The authors have also reached the conclusion that banks' risks measured by stock volatility increase unused loan commitments and reflect liquidity risk exposure. This increase is alleviated by transaction deposits. Moreover, the risk does not increase with loan commitments for banks with transaction deposits. (Gatev et al., 2005).

The authors have also extended these results by testing how the deposit-lending diversification synergy varies across market conditions. Banks having high level transaction deposits have decreased risks with the level of unused commitments when the spread of commercial paper-treasury bills are high. The deposit-lending hedge is prevailing in times when the short term credit market become expensive because banks face increased take-down demands by borrowers shocked by tight market conditions at the same time that they are experience funding inflows into their transaction deposits. The inflows and outflows offset in turn strengthen the risk management synergy. Furthermore, transaction deposit plays an important role in allowing banks to manage their liquidity risk (Gatev et al., 2005).

Basu (2005) on a study pertaining to the development of a financial system to India's poor, building an inclusive banking system will require more radical overhauling in order to ameliorate incentive regime, promote competition and enhance the efficiency of rural financial institutions and markets. One of the suggested measures is allowing the most competitive lender to enter in rural areas and decrease distortion by having the government make a priority sector lending obligations tradable. The highest competing lender will be paid by the less well placed banks to effectively take their priority lending requirements for a price. Creating a market for priority lending requirements would benefit the rural poor and the banks. They will be able to access finance via the most competitive institutions (Basu, 2005).

Another suggested measure is for the government to revisit its policy on interest rates caps pertaining to rural lending rates and floors on deposit rates. Poor borrowers are deprived of

accessing finance and end up paying high interest rates to informal lenders. In addition to that, the entry of new private banks in rural finance could be a good indication for other rural banks to reduce transaction costs and making rural banking profitable. This move shall be sponsored by the governments that should create an environment that would make it possible and lucrative for interested private banks to emerge in the rural financial market. Moreover, much is needed to increase competition in rural banking by liberating interest rates, hence, lending to small and rural clients can become more profitable business for banks. Having mentioned the emergence of banks in rural areas, governments will have to amend their policies on branch licensing, as private banks may be interested in buying up the branch networks of the government-owned rural banks (Basu, 2005).

The author perceives that weaknesses in regulatory standards, slacking enforcement, and regulatory forbearance have invested deeply in the financial distress that characterizes many regional rural banks and cooperatives and have undermined market discipline. Prudential regulation standards such as capital adequacy, income recognition, asset classification, and provisioning for regional rural banks and cooperatives need to cope with standards governing commercial banks, and supervisory enforcement needs to be strengthened (Basu, 2005).

Beck, Kunt, Peria (2007) view that broad financial services outreach is vital for several reasons. That are a well-developed financial system for economic development and poverty alleviation. Financial market imperfections such as transaction costs, information asymmetries, contract enforcement costs are likely to have their toll on poor households and or small entrepreneurs who lack collateral, credit history, and connections. The lack of access to financial services in general places impedes poor households and small entrepreneurs to realize high return investments, it also reduces the efficiency of resources allocations and impact growth negatively and poverty alleviation (Beck et al., 2007).

Honohan (2008) has reported that products' features such as high minimum cover for an insurance product, or hefty penalties for unauthorized overdraft which tends to be inevitable to avoid for poor people using checking accounts. In addition to have a fixed address as a pre-requisite to open an account, are all illustrations of obstacles standing in the way between the end-user and these products. In some other cases, customers may be screened out because of risk characteristics. Other obstacles hampering the utility of these services is the rationalization of

branches and service points may lead to in many poor customers compelled to travel far distances to make an account worthwhile. For the reason that full participation in economic life in advanced economies rely on having an account in a financial intermediary, and given the extra costs often on non-account holders, several countries have adopted policies in recent years to reduce financial exclusion (Honohan, 2008).

Honohan perceives exclusion in low and middle income countries to be normal for the bulk of the population. Thus it is normal to entertain broadening the access to financial services rather than the elimination of exclusion as the immediate goal. With that being said, it is rational that microfinance emerges heavily in this breading environment for financial development. Microfinance pioneers have shed light on the very high rates of returns that can be earned by the poor and the near-poor in urban and peri-urban settings. This furnishes a high demand for borrowings even at high interest rates. Some microfinance institutions work on credit–only basis, funding themselves from charitable donors, while some others employ forced savings elements to the loan framework. In general, the trend is to emphasize deposits the same way as loans as a vital tool for efficient financial management, no matter they represent precautionary savings, or means of accumulating capital. It is also crucial to mention that transaction accounts are also important for receiving and making remittances on a local and international levels among family members (Honohan, 2008).

Mookerjee and Kalipioni (2010) have concluded in their studies that there is a robust support for the general idea that micro focused measures of financial development have a positive impact on the poor and income distribution. The study has resolved to the fact that better access to bank branches, which is translated into availing banking services to the underserved segments of the community have positive impact on the poor. However, the study has detected that higher barriers to banking services measured by imposing higher minimums to open checking/savings account has negative impact on income distribution (Mookerjee & Kalipioni, 2010).

Jeanneney and Kpodar (2011) has concluded that the physical and human capital investments by the poor are subject to liquidity constraints. Moreover, improvement in the financial intermediation positively affects the poor because it creates opportunities for the former to possess liquid assets and earn higher return on their savings. In times of economic booming, they may start from benefiting from greater availability of credit. However, bank crises are likely to

harm the poor who have very few opportunities to diversity their assets (Jeanneney & Kdobar, 2011).

Celerier and Matray (2016) on a study about bank branch supply and the unbanked phenomenon, perceives that being unbanked is driven by supply and or demand side factors. The demand side revolves around cultural determinants, that is, distrust in financial institutions or may not have culture of saving. Financial literary also remains a major persistent element of a deeply rooted communal culture. On the other hand, the supply side suggests that standard bank practices create obstacles for the poor. Minimum account balance, overdraft fees, a large distance between branches, results in increasing costs that may be to burdening for poor households to manage. Moreover, banking services may not be customized to match the demands of low-income households. These hurdles can have different policy implications. The demand side predicts intervention at the household level through financial literacy programs, while the supply side concerning banking regulations should be solved by giving banking incentives to amend their behavior, which lead to reducing the share of unbanked households (Celerier & Matray, 2016).

Kodongo (2018) has analyzed the relationship between capital adequacy and liquidity and credit to high risky small scale agriculture. The analysis has resided to the fact that, choking prudential regulations could hamper the provision of credit to small businesses and therefore conflict with the country's financial inclusion objectives. The capital adequacy requirement narrows banks' ability to avail credit to small business clients and may result in credit rationing. However, the author sees that the effect of capital regulations on credit provision could be controlled with few macroeconomic enablers. These enablers could be in the form of measures implemented to achieve stability in the financial sector and in the macroeconomic environment (Kodongo, 2018).

This emerges with the end in mind to reduces the level of financial exclusion which in its turn threatens financial integrity. In other words, seeing financially excluded individuals resort to informal financial services, this is likely to compromise on the effectiveness of anti-money laundering and counter-financing terrorism measures which are two of the main priorities on the Financial Action Task Force (FATF)'s agenda. In this respect, there are concerns that the establishment of some financial integrity jurisdictions such as, raising costs of compliance, imposing regulatory obstacles against new service providers and creating eligibility barriers could cease the realization of financial inclusion. Henceforth, to reduce the tension lying in the

nexus of financial integrity and financial inclusion, the FATF recommends that low-income countries to have exemptions such as relaxing identification requirements in specific well instances, which is the case in countries like India (Kodongo, 2018).

Anarfo, Abor, and Osei (2019) views that despite the role performed by financial regulation to block distortion to competition, sustaining integrity of the market, and reducing information asymmetry, they may also have unwanted implications by hampering the efficient intermediation process of financial institutions and inhibit their ability to provide financial services. For example, capital adequacy regulation may force some banks that are not financially competent to cease business or merge with other banks and this may cause barriers to emerge into the banking sector. Naturally, this will decrease competition and the availability of funds to commercial banks for lending, which will eventually harm the realization of financial inclusion. Nevertheless, low credit volumes dictated by iron fist financial regulations, may encourage lenders to seek profits by lending to only successful credit applications at high interest rates. Furthermore, this will curb levels of access to credit, hence, leading to low financial inclusion (Anarfo et al., 2019).

We can observe that Anarfo et. al have a sort of agreement with the views of Kondogo. However, the former have introduced financial stability measured by the bank Z-score to moderate the relationship between financial regulation and financial inclusion. In this respect, the study has concluded that the interaction of financial stability and financial regulation has a positive effect on financial inclusion in the study's population, that is, Sub-Saharan African economies. This suggests that financial stability negates the negative consequences of financial regulation on financial inclusion in Sub-Saharan Africa. This means that financial regulation has no impact on financial inclusion when financial institutions is financially stable. Putting this fact in mind, policy and regulatory bodies should focus on nurturing financial stability as a tool for the propagation of financial service usage as well as for better financial decision making at the micro and macro levels (Anarfo et .,2019).

Chapter Three

Statistical Tests, Estimations Methods and Results

Part One

III.1.a Introduction

In this Part the variables upon which the study is conducted are defined. Furthermore, the sources from which the variables are extracted are highlighted. In addition, the part will be devoted to achieve and discuss measures of rounded descriptive analysis such as Normality test; Linearity test and the Heteroskedasticity test.

This section reports the results of regressing the common indicators of financial inclusion on an indicators of banks' credit risk. The results are reported in tables (3-5), where table (1) list the factors examined in the thesis and table (2) summarizes the factors used in the thesis. With the end in mind to conduct the all the following estimations, the researcher has used Statistical Package for Social Sciences (SPSS).

III.1.b Data

The data about financial inclusion is obtained mainly from the Global Findex compiled by the World Bank (https://globalfindex.worldbank.org/). This index includes data about financial inclusion in three-year intervals 2011, 2014, 2017.

The data about banks' credit risk is obtained from Fitch IBCA's Bankscope database.

The data include banks located in the MENA region. The countries included in the study are Algeria, Bahrain, Djibouti, Egypt, Iraq, Israel, Jordan, KSA, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Syria, Tunisia, UAE and Yemen.

III.1.c The Study variables

The variables examined in this thesis are as follows.

1. **The Dependent variable (Y)**: The ratio of Provision for Loan Losses to Net Loans. This ratio is taken as a proxy for credit risk.
2. **The Independent variable (X)**: these include indicators of financial inclusion that have been examined in the literature. These indicators are as follows.

   X1: Saved at a financial institution (≥age15)

   X2: Debit card ownership (≥age15)

X3: Borrowed from a financial institution (≥age15)

X4: Borrowed from a financial institution or used a credit card in labor force (≥age15)

X5: Borrowed from a financial institution or used a credit card out of labor force (≥age15)

In addition to the above-mentioned main variables, the Country effects and longevity effects are examined through additional dummy variables in order to offer complete understanding to the factors that may have effect on financial inclusion.

Table (1): List of the factors examined in the thesis

Variable	Measure	References
Saved at a financial institution (≥age15)	The percentage of Respondents who report saving or setting aside any money at a bank or another type of financial institution in the past 12 months.	Global Findex database
Debit card ownership (≥age15)	The percentage of respondents who report having a debit card	Global Findex database
Borrowed from a financial institution (≥age15)	The percentage of respondents who report borrowing any money from a bank or another type of financial institution in the past 12 months	Global Findex database
Borrowed from a financial institution or used a credit card in labor force (≥age15)	The percentage of respondents who report borrowing any money from a bank or another type of financial institution, or using a credit card, in the past 12 months, in labor force	Global Findex database
Borrowed from a financial institution or used a credit card out of labor force (≥age15)	The percentage of respondents who report borrowing any money from a bank or another type of financial institution, or using a credit card, in the past 12 months, out of labor force	Global Findex database
Ratio of Provision for Loan Losses	Credit risk	Fitch IBCA's Bankscope database

to Net Loans		

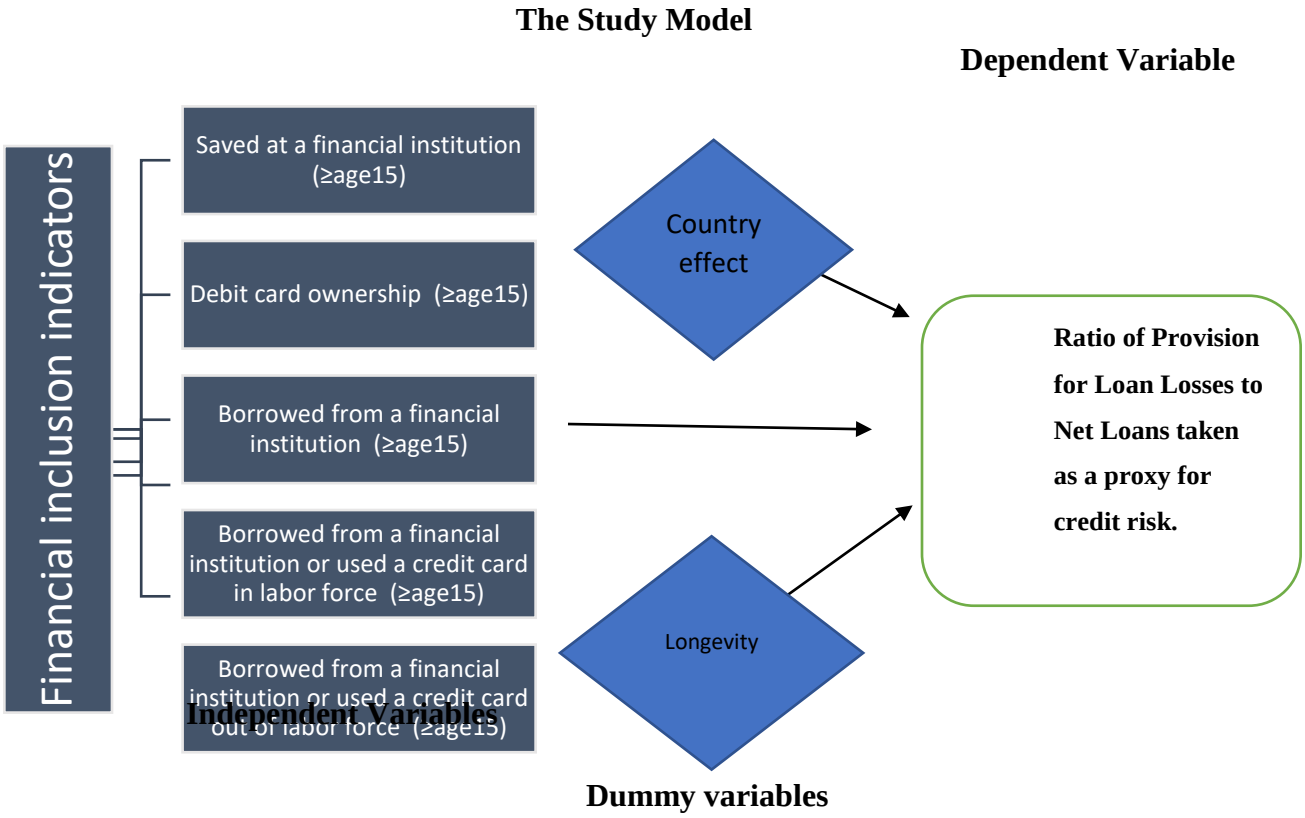

Table (2) summarizes the factors examined in this thesis.

Source: The author

III.1.c The Study Methodology and Measures

In order to acquire rounded descriptive analysis and sound results, which in turn, lead to achieving the main objective of the conducted study, thus, three technicalities and tests used respectively presented as follow; Normality test; Linearity test and the Heteroskedasticity test.

First, the study uses the Normality test to determine if a data set is well-modeled by a normal distribution. The tests also compute how likely it is for a random variable underlying the data set to be normally distributed. Many statistical methods require that the data come from a normal distribution or at least can be reasonably approximated by a normal distribution. Relatively, Kolmogorov-Smirnov and Shapiro-Wilk test is used where the latter test is said to be the

preferred test of normality because of its good power properties as compared to a wide range of alternative tests (Shapiro, Wilk, & Chen, 1968).

Normality Test

Regarding the issue of normality, Kolmogorov-Smirnov and Shapiro-Wilk test is used for testing the closeness of the variables' distribution to the assumptions of the normal distribution.[1] The test is run under the hypothesis that:

H_0: The data are drawn from normal distribution.

H_a: The data are drawn from non-normal distribution

The results of normality show that all variables are not normally distributed. Table (3) reports the results of Kolmogorov-Smirnov and Shapiro-Wilk test.

Table (3): The Results of Kolmogorov-Smirnov and Shapiro-Wilk test for Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Provision for loan losses to Net Loans	0.08672	524	4.35734E-10	0.87806	524	7.2454E-20
Saved at a financial institution (≥age15)	0.14463	524	1.25883E-29	0.90828	524	3.0677E-17
Debit card ownership (≥age15)	0.21012	524	1.51609E-64	0.8876	524	4.2808E-19
Borrowed from a financial institution (≥age15)	0.15997	524	1.38563E-36	0.86716	524	1.0733E-20

Borrowed from a financial institution or used a credit card in labor force (≥age15)	0.17537	524	2.53375E-44	0.86138	524	4.0837E-21
Borrowed from a financial institution or used a creditcard out of labor force (≥age15)	0.24227	524	1.14524E-86	0.72428	524	1.6376E-28
a. Lilliefors Significance Correction						

Therefore, an approximation to normality is necessary to satisfy the multivariate analysis main assumptions. In other words, the variables are converted to normality in order to confirm that the data sample is extracted from a normally distributed population. This assumption is indispensable to conduct several statistical procedures such as the t-test, linear regression analysis, analysis of variance (ANOVA) and discriminant analysis (Conover and Iman, 1979).[2] Van der Waerden method is carried out to approximate data to normal distribution (Conover, 1980; van der Waerden, 1927, 1930, 1931; Wright, 2000) based on smoothed ranks. The signed ranks are smoothed by converting them to quantiles of the normal distribution[3] (normal scores) using the equation that follows:

$$A_{ij} = \Phi^{-1}\left(\frac{R\left(x_{ij}\right)}{T+1}\right)$$

[1] Conover, W.J. and Iman, R.L. (1979). On multiple-comparison procedures. Technical report, Los Alamos Scientific Laboratory

[2] Krzysztofowicz, R. 1997. Transformation and normalization of variates with specified distributions, Journal of Hydrology, 197(1-4): 286–292.
Pohlert, T. 2014. The Pairwise Multiple Comparison of Mean Ranks Package (PMCMR). R package. Available at http://CRAN.R-project.org/package=PMCMR

A_{ij} = Normal score of each observation in a variable (x_{ij})

$R\left(x_{ij}\right)$ = The ordinary rank where observations of a variable (x_{ij}) are ranked in an ascending order.

$\left(\frac{R\left(x_{ij}\right)}{T+1}\right)$ = cumulative probabilities of each observation in a variable (x_{ij}). Ranks are smoothed through the computation of the probability associated with each observation.

T = Total number of observations in a variable (x_{ij})

Φ^{-1} = the quantile of the normal distribution **is the inverse of each probability given by** $\left(\frac{R\left(x_{ij}\right)}{T+1}\right)$

It is worth to note that, the dummy variables are not normalized as the values are binary, taking values 1 and 0, therefore they are dichotomous.

Linearity Test

The issue of linearity versus nonlinearity is addressed and examined as well (Bahng and Jeong, 2012; Pao and Chih, 2005). Regression Equation Specification Error Test, RESET (Ramsey, 1969; Thursby and Schmidt, 1977; Thursby, 1979; Sapra, 2005; Wooldridge, 2006) is employed to test the two hypotheses that follow:

For the test the null hypothesis is

$$\text{H0: } \mathbf{y}_{tk} = \alpha_k + \sum_{i=1}^{k} \beta_{ik} \mathbf{X}_{itk} + \lambda_k + \upsilon_{tk}$$

And the alternative hypothesis is:

$$\text{H1: } \mathbf{y}_{tk} = f(\mathbf{X}_{itk}, \alpha_k, \beta_{ik}, \lambda_k) + \upsilon_{tk}$$

where *f* is any nonlinear function

The null hypothesis refers to linearity and the alternative refers to nonlinearity.[4] In case of linearity, the OLS estimation condition is fulfilled. In case of non-linearity, the literature includes

[4] $F-\text{statistic} = \frac{\left(\text{SSE}_R - \text{SSE}_U\right) \div J}{\text{SSE}_U \div \left(T - K\right)}$ where SSE_R and SSE_U are the sum squared errors for the restricted and unrestricted models respectively, J refers to the two hypotheses under consideration, T is the number of observations, and K is the number of regressors.

different treatments. One treatment is to take the log or natural log to both dependent and independent variables (Allen, 1997; Chatterjee and Hadi, 2012)[56]. The researcher of this thesis argues that this treatment does not work out as many of the variables take negative values as well as many variables are less than one. In case of negative values, the log or natural log do not exist. In cases that the variables are less than one, either the log of natural log result in negative values which cause distortions to the true relationship between the independent and dependent variables.

Another treatment of the non-linear transformation is to address a polynomial transformation when variables might be raised to a power either 2 to address quadratic relationship or 3 to address cubic relationship (Berry and Feldman, 1985; Pindyck and Rubinfeld, 1991; McClendon; Briand and Carter. 2011)[7]. The researcher of this thesis has chosen to treat the independent variables as cubic since it does not cause any change to the relationship between dependent and independent variables. The negative values remain negative in cubic form. The same is true in case of positive values.

The RESET test is an approximation to nonlinearity that has been recommended in well-known econometric textbooks such as Greene. The objective of the test to approximate to nonlinearity. The RESET test follows the F distribution. The results of the RESET test are reported in table (4).

Table (4): The Results of the RESET test: main factors that affect financial inclusion

Hypothesis Testing Using the F distribution

Data Input	
J	2
T	524
K	5
SSE-restricted	0.03351

[5] Allen, M. P. 1997. Understanding Regression Analysis. Plenum Press, New York.

[6] Chatterjee, S. and Hadi, A.S. (2012) Regression Analysis by Example. 5th Edition, Wiley, New York, 98.

[7] Briand, G. and Hill, R. Carter. 2011. Using Excel for Principles of Econometrics. 4th edition, Wiley

SSE-Unrestricted	0.03279
Alpha (Prob)	5.00%
Computed Values	
df-numerator	2
df-denominator	519
F	5.7136
Right Critical Values	3.0131
Decision	Reject Ho
p-value	0.00351

Thus, the independent variable is raised to the power of 3 as way of approximation to nonlinear form.

Heteroskedasticity Test

Heteroskedasticity refers to varying variances of the error term which causes bias in the statistical estimation. The researcher uses Breusch-Pagan test (1979) and Cook-Weisberg (1982,1983) test to examine the extent to which the amounts of FDI are heterogeneous.[8] The standard test runs on the square of the error term. The test is run under the hypotheses and the estimation equation that follow:

$$\hat{e}_{it}^2 = \alpha + \sum_{t=1}^{n} \beta_i x_{it} + \nu_i$$

$\boldsymbol{\hat{e}_{it}^2 = predicted\ error\ term\ residual\ squared}$

H0: "Error variances are all equal (Homoskedastic)"

H1: "Error variances are not equal (Heteroskedastic)"

Table (5): The Results of Breusch-Pagan / Cook-Weisberg Test for Heteroskedasticity.

Lagrange Multiplier Test Template

Data Input	524
Number of parameters (s)	5

[8] Breusch, T. S., and A. R. Pagan. 1979. A simple test for heteroscedasticity and random coefficient variation. Econometrica 47: 1287–1294.
Cook, R. D., and S. Weisberg. 1982. Residuals and Influence in Regression. New York: Chapman & Hall/CRC.
_____. 1983. Diagnostics for heteroscedasticity in regression. Biometrika 70: 1–10.

R square	0.00665
Alpha	5%
Computed Values	
Degree of Freedom (m=s-1)	4
Critical Value - Chi square	9.49
Lagrange Multiplier Test	
Chi Square stat	3.4842
Conclusion	Do Not Reject H0
p-value	0.48028
Conclusion	Do Not Reject H0

The results reported in table (5) show that Heteroskedasticity doesn't exist.

Estimation Model

The general estimating equation of a nonlinear model takes the form of Least Squares Dummy Variables (LSDV) that follows.

$$\mathbf{y}_{tk} = \alpha_k + \sum_{i=1}^{k} \beta_{ik} \mathbf{X}^3_{itk} + \lambda_k + \upsilon_{tk}$$

Where t = 1, …..,n

k = number of countries in each group.

$\mathbf{y}_{tk}$ = The ratio of Provision for Loan Losses to Net Loans.

$\mathbf{X}_{itk}$ = Indicators of Financial Inclusion in addition to dummy variables to control for the country effects and longevity effects.

λ_k = Random error term due to the individual effect.

υ_{tk} = Random error.

Hausman Test

The researcher has carried out the well-known Hausman test for determining whether the models are subject to Fixed or Random effect.[9] The results are as follows. Hausman (1978) test is used to choose between a fixed or random-effects model. null Hypothesis is that random Effects Model is appropriate test. Table (6): Hausman Test Results (Fixed Effect Model vs. Random Effect Model).

Chi-square statistic	Chi-square degrees of freedom	Prob.
10.288263	5	0.0675

The results reported in Table (6) show that the null hypothesis is not rejected at 5% significant level implying that the model follows random effects.

[9] Hausman, J.A. (1978), "Specification tests in econometrics", Econometrica, Vol. 46 No. 6, pp. 1251-1271.

Part 2

III.2.a Introduction

In this section we shall run the regression equation on several iterations, we regress the proxy for credit risk against the financial inclusion indicators, then in the following iterations we add the countries effect and the Longevity effect one at a time. Post observing the outcomes of the empirical analysis we shall compare them with the previous literature review to identify whether they challenge past scholars' arguments or they support them. However, the longevity effect is the latest contribution to the literature and hence it will suffice to only comment on the results in this regard.

This section reports the results of regressing the common indicators of financial inclusion on the indicator of banks' credit risk. The results are reported in tables (1-14).

3.2-1 Part One: The Results for the Effect of Indicators of Financial Inclusion on Banks' Credit Risk

Table (1): Model Summary of the effect of the Main Indicators of Financial Inclusion on Banks' Credit Risk (N = 524)

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.253[a]	.064	.055	.00824498	1.180

a. Predictors: (Constant), Borrowedfromafinancialinstitutionorusedacreditcardoutoflaborforc, Debitcardownershipage15, Borrowedfromafinancialinstitutionage15, Savedatafinancialinstitutionage15, Borrowedfromafinancialinstitutionorusedacreditcardinlaborforceag

b. Dependent Variable: ProvisionforloanlossesNetLoans

Table (2): ANOVA table for the Effect of Indicators of Financial Inclusion on Banks' Credit Risk (N = 524)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.002	5	0.00048	7.097	.000[b]
	Residual	.035	518	0.00007		
	Total	.038	523			

a. Dependent Variable: ProvisionforloanlossesNetLoans

b. Predictors: (Constant), Borrowedfromafinancialinstitutionorusedacreditcardoutoflaborforc, Debitcardownershipage15, Borrowedfromafinancialinstitutionage15, Savedatafinancialinstitutionage15, Borrowedfromafinancialinstitutionorusedacreditcardinlaborforceag

Table (3): The effect of the Indicators of Financial Inclusion on Banks' Credit Risk (N = 524)

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.008	.000		17.168	.000		
	Savedatafinancialinstitutionage15	-.031	.022	-.138	-1.372	.171	.178	5.629
	Debitcardownershipage15	.009	.003	.211	3.633	.000	.535	1.870
	Borrowedfromafinancialinstitutionage15	.022	.065	.033	.343	.732	.191	5.239
	Borrowedfromafinancialinstitutionorusedacreditcardinlaborforceag	-.041	.015	-.961	-2.667	.008	.014	7.904
	Borrowedfromafinancialinstitutionorusedacreditcardoutoflaborforc	.174	.073	.855	2.372	.018	.014	7.967
a. Dependent Variable: ProvisionforloanlossesNetLoans								

3.2-2 Part Two: The Results for the effects of Indicators of Financial Inclusion and Country Effects on Banks' Credit Risk

Table (4): Model Summary of the effects of Indicators of Financial Inclusion and Country Effects on Banks' Credit Risk (N = 524)

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.662[a]	.438	.413	.00650032	1.592

a. Predictors: (Constant), Yemen, Libya, Djibouti, Oman, Qatar, Syria, Morocco, Iraq, Kuwait, Bahrain, KSA, Malta, Tunisia, Jordan, Borrowedfromafinancialinstitutionorusedacreditcardoutoflaborforc, Algeria, UAE, Egypt, Borrowedfromafinancialinstitutionage15, Debitcardownershipage15, Savedatafinancialinstitutionage15, Borrowedfromafinancialinstitutionorusedacreditcardinlaborforceag, Israel

b. Dependent Variable: ProvisionforloanlossesNetLoans

Table (5): ANOVA table for the effects of Indicators of Financial Inclusion and Country Effects on Banks' Credit Risk (N = 524)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.016	23	0.00072	16.977	.000[b]
	Residual	.021	500	0.00004		
	Total	.038	523			

a. Dependent Variable: ProvisionforloanlossesNetLoans

b. Predictors: (Constant), Yemen, Libya, Djibouti, Oman, Qatar, Syria, Morocco, Iraq, Kuwait, Bahrain, KSA, Malta, Tunisia, Jordan, Borrowedfromafinancialinstitutionorusedacreditcardoutoflaborforc, Algeria, UAE, Egypt, Borrowedfromafinancialinstitutionage15, Debitcardownershipage15, Savedatafinancialinstitutionage15, Borrowedfromafinancialinstitutionorusedacreditcardinlaborforceag, Israel

Table (6): The effect for the effects of Indicators of Financial Inclusion and Country Effects on Banks' Credit Risk (N = 524)

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.0041	0.0013		3.0661	0.0023		
	Saved at a financial institution age15	-0.0383	0.0438	-0.1734	-0.8740	0.3825	0.0285	5.0525
	Debit card ownership age15	0.0044	0.0048	0.0984	0.9144	0.03610	0.0971	8.3032
	Borrowed from a financial institution age15	0.0854	0.1213	0.1282	0.7036	0.4820	0.0338	9.5776
	Borrowed from a financial institution or used a credit card in labor force	-0.0261	0.0409	-0.6169	-0.6377	0.05240	0.0012	3.4219
	Borrowed from a financial institution or used a credit card out of labor force	-0.0533	0.2671	-0.2617	-0.1994	0.8420	0.0007	2.7141
	Algeria	0.0049	0.0016	0.1647	3.0431	0.0025	0.3836	2.6071
	Bahrain	0.0048	0.0039	0.1167	1.2365	0.2169	0.1262	7.9268
	Djibouti	0.0119	0.0040	0.1057	2.9934	0.0029	0.9011	1.1098
	Egypt	0.0029	0.0016	0.1021	1.8298	0.0679	0.3608	2.7714
	Iraq	0.0123	0.0020	0.2641	6.0222	0.0000	0.5840	1.7123
	Israel	0.0264	0.0335	0.8724	0.7878	0.4312	0.0009	9.8204
	Jordan	0.0074	0.0017	0.1985	4.3553	0.0000	0.5406	1.8498
	KSA	0.0016	0.0021	0.0405	0.7999	0.4241	0.4371	2.2877
	Kuwait	0.0092	0.0041	0.2085	2.2551	0.0246	0.1314	7.6100
	Libya	0.0192	0.0040	0.1708	4.8321	0.0000	0.8987	1.1127
	Malta	0.0086	0.0067	0.2154	1.2803	0.2010	0.0397	5.2128
	Morocco	0.0048	0.0021	0.1006	2.3162	0.0210	0.5957	1.6788
	Oman	-0.0015	0.0030	-0.0194	-0.5120	0.6088	0.7861	1.2721
	Qatar	-0.0014	0.0027	-0.0206	-0.5358	0.5923	0.7621	1.3121
	Syria	0.0142	0.0026	0.2171	5.5192	0.0000	0.7260	1.3774

	Tunisia	0.0061	0.0017	0.1614	3.5403	0.0004	0.5403	1.8508
	UAE	0.0096	0.0028	0.3576	3.4703	0.0006	0.1058	9.4535
	Yemen	0.0890	0.0066	0.4586	13.4146	0.0000	0.9609	1.0407
a. Dependent Variable: Provision for loan losses / Net Loans								

Given the output of table (1), this paper concludes that 6.4% variability in the dependent variable can be explained by the independent variables, which is illustrated by the measure of quality of fit provided by R squared. As noted by the significance of F test in the output from ANOVA table (2), it implies that the regression model is significant in predicting the relationship between financial inclusion indicators and credit risk.

In the attempt to regress the credit risk and financial inclusion indicators, the coefficients' table (3) has yielded that "saving at financial institutions" and "borrowed from financial institutions" predictor variables are not significant in predicting the relationship between the independent variables and the dependent variable. It is also observed that "debit card ownership" and "borrowed from financial institutions or used credit card out of labor force" has significant positive relationship with credit risk. If these two variables increase, they will increase the credit risk with 0.009 and 0.174 respectively. However, the predictor variable "borrowed from financial institution or used credit card in labor force" has a significant negative relationship with credit risk. Hence, when it increases, it will decrease the credit risk with 0.41. Having that said, it is important to mention that the discussion to the results doesn't refer to the size of decrease or increase in Xs. The discussion focuses mainly on the trend, being negative or positive, and the significance.

It is worth to note that, Variance Inflation Factors (VIFs) are used to detect collinearity (also called multicollinearity) among predictors in a multiple linear regression model (Belsley, et al. 1980)[10]. High VIFs reflect an increase in the variances of estimated regression coefficients due to collinearity among predictor variables, Basically, (VIF) is the quotient of the variance in a model with multiple terms by the variance of a model with one term alone. It quantifies the severity of multicollinearity in an ordinary least squares regression analysis. We analyze the magnitude of

[10] Belsley D.A, Kuh E. and Welsch R.E. (1980) Regression Diagnostics: Identifying Influential Data and Sources of Collinearity, New York: John Wiley & Son.

multicollinearity by considering the size of the VIF. A rule of thumb is that if VIF is greater than 10, then multicollinearity is high, (Kutner, 2004)[11]. Moreover, a cutoff of 5 is also commonly used (Sheather, 2009)[12].

By adding countries' individual effect on the model, there is an obvious improvement in the model in table (4) given by adjusted R squared which increased from 5.5% to 41.3% This observation indicates that the country effect is a good predictor to credit risk, which if otherwise, the adjusted R square will decrease as a penalty for adding junk predictors to the regression equation. It is also observed the STD Error has decrease from 0.00824 to 0.00650 indicating model improvement. The output given by ANOVA table (5), the significance of the F test states that the regression model is significant in predicting the relationship between financial inclusion indicators and countries' effect impact on the credit risk.

The coefficient table (6) has provided that only the predictor variable "debit card ownership" and "borrowed from a financial institution or used a credit card in labor force (≥age15)" are significant predictors to the credit risk. Moreover, "debit card ownership" variable have positive relationship with the credit risk, however. "borrowed from a financial institution or used a credit card in labor force" has a negative relationship with credit risk. As for the countries effect, the thesis concludes that the countries the most affected by credit risk caused by financial inclusion initiatives are Algeria, Djibouti, Egypt, Iraq, Jordan, Kuwait, Libya, Morocco, Syria, and Tunisia, UAE, and Yemen.

The provisions of the empirical analysis prove the argument of Khan (2011), Merhotra and Yetman (2015), and Sahay et al (2015). That is financial inclusion can contribute negatively to financial stability due to the expansion of the pool of borrowers that blemishes the lending standards given by the positive relationship between credit risk variable and "borrowing from a financial institution or through a credit card out of labor force". Also they prove the argument of Hanning and Jansen (2010) that states that the inclusion of low income groups in the financial sector tends to raise the stability of the deposit and loan basis. This is given by the negative

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[11] Kutner, M. H.; Nachtsheim, C. J.; Neter, J. (2004). Applied Linear Regression Models (4th ed.). McGraw-Hill Irwin.

[12] Sheather, Simon (2009). A modern approach to regression with R. New York, NY: Springer.

relationship between credit risk and "borrowing from a financial institution or credit card in labor force". However, it is worth to mention that not all income groups should be financially included illustrated in the difference between those in and out of labor force. This is illustrated in the positive relationship between credit risk and "borrowing from financial institutions or by credit cards out of the labor force". Given the negative relationship between credit risk variable and "borrowing from a financial institution or a credit card in labor force". This outcome concurs the argument of Lopez and Winkler (2019) that more inclusive banking sector are likely to record decreases in credit and borrowers' growth in times of crisis.

The results also support Berger and Bouwman's (2009) financial fragility-crowding out hypothesis and risk absorption hypothesis in the sense of, the higher the liquidity being created due to the demand on cash and withdrawals the more banks are prone to risks. This could be demonstrated in the positive relationship between the credit risk variable and "debit card ownership variable". The positive relationship between the credit risk and "the debit card ownership" justifies the outcome of the research conducted by Castellanos, Henrnandez, Mahajan, and Sierra (2018), whereas providing credit cards to "new to bank" borrowers results in substantial risk. This is linked to debit cards as the issuance of credit cards is collateralized against a saving account associated with a debit card. It also supports the argument of Awad and Eid (2018) on the redistribution of credit towards new borrowers' segments comes with a cost at the account of financial intermediary efficiency illustrated in high screening and information costs.

The impact of credit risk due to the emergence of financial inclusion on the chosen sample of countries could be justified through several hypotheses mentioned in the literature review. The increase in credit risk in countries could be associated with Kjosevski and Petkovski's (2016) argument on the variation of the NPL due to the negative correlation with GDP. Moreover, the inflation rate has demonstrated a negative correlation with the NPL, while the lending interest rate has demonstrated a positive correlation with NPL, the same case for unemployment. The empirical analysis on countries effect can be further explained by Bhattarai (2017), that NPL could be altered by banks' performance metrics such as ROE, bank efficiency and loans categories. Furthermore, the increasing credit risk could be justified by Pearce (2011) that

financial inclusion in the MENA region faces deficiencies in the financial infrastructure and regulations that enforce it. This makes increasing access to finance riskier and costlier for banks.

3.2-3 Part Three: The Results for the effects of Indicators of Financial Inclusion and Longevity Effects on Banks' Credit Risk

Table (7): Model Summary for the for the effects of Indicators of Financial Inclusion and Longevity Effects on Banks' Credit Risk (N = 524)

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.290[a]	.084	.072	.00817264	1.091
a. Predictors: (Constant), long6, Debitcardownershipage15, Borrowedfromafinancialinstitutionorusedacreditcardinlaborforceag, long3, Borrowedfromafinancialinstitutionage15, Savedatafinancialinstitutionage15, Borrowedfromafinancialinstitutionorusedacreditcardoutoflaborforc					
b. Dependent Variable: ProvisionforloanlossesNetLoans					

Table (8): ANOVA table for the for the effects of Indicators of Financial Inclusion and Longevity Effects on Banks' Credit Risk (N = 524)

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.003	7	0.00045	6.761	.000[b]
	Residual	.034	516	0.00007		
	Total	.038	523			
a. Dependent Variable: ProvisionforloanlossesNetLoans						
b. Predictors: (Constant), long6, Debitcardownershipage15, Borrowedfromafinancialinstitutionorusedacreditcardinlaborforceag, long3, Borrowedfromafinancialinstitutionage15, Savedatafinancialinstitutionage15, Borrowedfromafinancialinstitutionorusedacreditcardoutoflaborforc						

Table (9): The effect of the Indicators of Financial Inclusion and Longevity Effects on Banks' Credit Risk (N = 524)

Coefficients[a]							
	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF

1	(Constant)	0.00896	0.00054		16.48835	0.00000		
	Saved at a financial institution age15	-0.036	0.02236	-0.16648	-1.64356	0.09088	0.17301	5.77993
	Debit card ownership age15	0.010	0.00259	0.23488	4.03779	0.00006	0.52459	1.90624
	Borrowed from a financial institution age15	0.066	0.06565	0.09960	1.00996	0.031299	0.18253	5.47869
	Borrowed from a financial institution or used a credit card in labor force	-0.040	0.01511	-0.97026	-2.71153	0.00692	0.01386	72.12825
	Borrowed from a financial institution or used a credit card out of labor force	0.171	0.07283	0.84146	2.35205	0.01905	0.01387	72.10018
	long3	-0.003	0.00098	-0.14834	-3.34071	0.00090	0.90027	1.11077
	long6	-0.000	0.00099	-0.02066	-0.47386	0.63580	0.93396	1.07071
a. Dependent Variable: ProvisionforloanlossesNetLoans								

Adding the dummy variables to control for the longevity effect, it is observed that the model has improved given by the increase of the adjusted R squared from 5.5% in table (1) to 7.2% in table (7). This is in addition to the decrease in the standard error from 0.0082 in table (1) to 0.0081 in table (7). Moreover, 8.4% variability in credit risk is explained by all predictor variables represented by the financial inclusion indicators and longevity 3 effect. This is provided by the measure of quality of fit R squared in table (7). The output from ANOVA table (8), proves that the significance of the F test implies that the regression model is significant in predicting the relationship between the financial inclusion indicators, longevity effect and credit risk. As for the coefficient's table (9), it is resolved that longevity 3 is significant in this regression equation, moreover, it is noticed that there is a negative relationship between the credit risk variable and longevity 3 effect given by the negative coefficient. In other words, it will take the finance inclusion at least 3 years to reduce the credit risk, which is a long term effect. Post adding the longevity effect, two variables that weren't significant in table 3, became significant in table 9. These variables are named "saving at financial institution" which has a significant negative

relationship with credit risk. Meaning if savings at financial institution increased, it will decrease credit risk by 0.036. The other variable is "borrowed from financial institution" which has significant positive relationship with credit risk. Meaning that if borrowings from financing institutions increased, it will increase credit risk by 0.066.

It is also noted that the statistical analysis supports the stance of Gatev, Schuermann, and Strahan (2005), Jeanneney and Kpodar (2011), and Han and Melecky (2013) on measuring financial inclusion by the wider access to and use of deposits which can improve banks' resilience in times of financial traumas. This is given by the negative relationship between credit risk and saving at financial institution variable. Furthermore, banks facing stock volatility, increased unusual loan commitments, and liquidity risk exposure are alleviated by transaction deposits.

The empirical analysis argues for the sake of Ghenemi, Chaibi, and Omri (2017) on the relationship between liquidity risk and credit risk on banks stability in the MENA region. Moreover, the increased credit default works on increasing liquidity risk due to the lowered cash inflows. We can perceive out of this analogy, that the increasing cash inflows as an outcome of saving at financial institution can control the credit risk. The positive relationship of "borrowing from financial institution" and credit risk supports the argument of Khan (2011), Merhotra and Yetman (2015), Sahay et al (2015), and Berger and Bouwman (2009).

3.2-4 Part Four: The Results for the effects of Indicators of Financial Inclusion, Country Effects and Longevity Effects on Banks' Credit Risk

Table (10): Model Summary for the effects of Indicators of Financial Inclusion, Country Effects and Longevity Effects on Banks' Credit Risk (N = 524)

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.681[a]	.464	.437	.00636537	1.472

a. Predictors: (Constant), Yemen, Libya, Djibouti, Oman, Qatar, Syria, Morocco, Iraq, Kuwait, Bahrain, long3, KSA, Malta, Tunisia, Jordan, Borrowedfromafinancialinstitutionorusedacreditcardoutoflaborforc, long6, Algeria, UAE, Egypt, Borrowedfromafinancialinstitutionage15, Debitcardownershipage15, Savedatafinancialinstitutionage15, Borrowedfromafinancialinstitutionorusedacreditcardinlaborforceag, Israel

b. Dependent Variable: ProvisionforloanlossesNetLoans

Table (11): ANOVA table for the effects of Indicators of Financial Inclusion, Country Effects and Longevity Effects on Banks' Credit Risk (N = 524)

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.017	25	0.00070	17.225	.000[b]
	Residual	.020	498	0.00004		
	Total	.038	523			
a. Dependent Variable: ProvisionforloanlossesNetLoans						
b. Predictors: (Constant), Yemen, Libya, Djibouti, Oman, Qatar, Syria, Morocco, Iraq, Kuwait, Bahrain, long3, KSA, Malta, Tunisia, Jordan, Borrowedfromafinancialinstitutionorusedacreditcardoutoflaborforc, long6, Algeria, UAE, Egypt, Borrowedfromafinancialinstitutionage15, Debitcardownershipage15, Savedatafinancialinstitutionage15, Borrowedfromafinancialinstitutionorusedacreditcardinlaborforceag, Israel						

Table (12): The effects of Indicators of Financial Inclusion, Country Effects and Longevity Effects on Banks' Credit Risk (N = 524)

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.0042	0.0013		3.1636	0.0017		
	Saved at a financial institution age15	-0.0445	0.0430	-0.2016	-1.0350	0.3012	0.0284	5.2343
	Debit card ownership age15	0.0078	0.0048	0.1762	1.6332	0.0931	0.0925	8.8085
	Borrowed from a financial institution age15	0.1264	0.1191	0.1899	1.0612	0.2891	0.0336	9.7446
	Borrowed from a financial institution or used a credit card in labor force	-0.0181	0.0402	-0.4286	-0.4503	0.0527	0.0012	1.2881
	Borrowed from a financial institution or used a credit card out of labor force	0.0605	0.2712	0.2972	0.2230	0.8236	0.0006	8.4350

	long3	-0.0039	0.0008	-0.1756	-4.8372	0.0000	0.8167	1.2244
	long6	-0.0008	0.0008	-0.0354	-0.9978	0.3188	0.8534	1.1718
	Algeria	0.0057	0.0016	0.1898	3.5522	0.0004	0.3772	2.6511
	Bahrain	0.0018	0.0040	0.0440	0.4519	0.6515	0.1137	8.7944
	Djibouti	0.0121	0.0039	0.1074	3.1001	0.0020	0.8969	1.1150
	Egypt	0.0036	0.0015	0.1291	2.3446	0.0194	0.3550	2.8168
	Iraq	0.0125	0.0020	0.2685	6.2509	0.0000	0.5834	1.7140
	Israel	0.0034	0.0340	0.1135	0.1009	0.9196	0.0009	3.4067
	Jordan	0.0084	0.0017	0.2256	4.9562	0.0000	0.5199	1.9234
	KSA	0.0015	0.0020	0.0381	0.7608	0.4472	0.4298	2.3269
	Kuwait	0.0070	0.0042	0.1584	1.6768	0.0942	0.1207	8.2869
	Libya	0.0207	0.0039	0.1839	5.2837	0.0000	0.8890	1.1248
	Malta	0.0054	0.0066	0.1362	0.8161	0.4148	0.0387	5.8489
	Morocco	0.0055	0.0020	0.1153	2.7029	0.0071	0.5913	1.6912
	Oman	-0.0012	0.0030	-0.0152	-0.4075	0.6838	0.7748	1.2907
	Qatar	-0.0008	0.0026	-0.0110	-0.2896	0.7722	0.7531	1.3279
	Syria	0.0154	0.0025	0.2366	6.0942	0.0000	0.7144	1.3997
	Tunisia	0.0065	0.0017	0.1734	3.8595	0.0001	0.5333	1.8753
	UAE	0.0074	0.0028	0.2773	2.6785	0.0076	0.1005	9.9524
	Yemen	0.0890	0.0065	0.4584	13.6924	0.0000	0.9609	1.0407

a. Dependent Variable: ProvisionforloanlossesNetLoans

By adding countries' individual effect to the model, an obvious improvement in the model has been noticed in table (10) given by the quality of fit the adjusted R squared which increased from 41.3% in table (4) to 43.7%. It is also observed the STD Error has decrease from 0.00650 to 0.00636 indicating model improvement. In other words, when the country effect has been added, 46.4% of the variability in credit risk is explained by financial indicators, countries' effect and longevity effect combined. The F significance given by ANOVA table (11) states that the regression model is significant in predicting the relationship between financial inclusion indicators, longevity and countries' effect impact on the credit risk. Given the coefficient's table (12), the thesis concludes that the countries the most affected by the credit risk caused by financial inclusion which are Algeria, Djibouti, Egypt, Iraq, Jordan, Kuwait, Libya, Morocco, Syria, Tunisia, UAE, and Yemen. The countries should direct their financial regulators to accumulate enough reserves for loan losses for at least 3 years to mitigate for the credit risk impact when initiating financial inclusive projects. After adding the countries' effect on the financial inclusion indicators and the longevity effect, only "debit card ownership" and

"Borrowed from financial institutions or used a credit card in labor force" are significant in predicting the relationship with credit risk. The reason why the significance became exclusive only to these two variables is due to the changing conditions in the group of countries tested. This can agree with the argument of with Kjosevski and Petkovski's (2016), Bhattarai (2017) and Pearce (2011).

III. Summary

Summing up the provisions of the empirical analysis, the thesis has come to the conclusion that the provision for loan losses to net loans as a proxy for credit risk is significant to some financial inclusion indicators namely "Debit card ownership", "borrowed from financial institutions or used a credit card in labour force" and "borrowed from financial institutions or used a credit card out of labour force". Credit risk turns to have negative relationship with "borrowing from financial institution through credit card in labour force". However, when accounting for the longevity effect, all financial inclusion indicators became significant in predicting the relationship with credit risk, where "saving at a financial institutions" and "borrowed from financial institutions or used a credit card in labour force" have a negative relationship with credit risk. Post the addition of countries' effect on the longevity effect and the financial inclusion indicators, credit risk significance became exclusive to only "Debit card ownership" affecting credit risk positively and "borrowed from financial institutions or used a credit card in labour force" affecting credit risk negatively. Moreover, initiating financial inclusion through formal financial institutions is likely to affect countries such as Algeria, Egypt, Iraq, Jordan, Kuwait, Libya, Morocco, Syria, Tunisia, UAE, and Yemen. In this respect, financial inclusion will start to have a negative impact on credit risk in 3 years in the above economies which is a long term effect.

Chapter Four

Conclusion and Recommendations

IV.a Conclusion

Financial inclusion is aimed at introducing the underserved segment of the community to the official financial institutions. It is without doubt that financial inclusion is one of the sustainable development goals to raise the poor's living standards by availing banking services that are not limited to loan acquisition. In this respect, this study aims at testing the relationship between the most used financial inclusion indicators and the ratio of the provision for loan losses to net loan as a proxy for credit risk. Using the Least Square Dummy Variables (LSDV) as estimation equation for non-linear model, it is found that borrowing from financial institutions or through credit card in labor force affects credit risk negatively. Meanwhile debit card ownership affects credit risk positively. Applying these results on the MENA region as the thesis's geographic scope, the countries the most affected by credit risk as a result of financial inclusion programs are Algeria, Egypt, Iraq, Jordan, Kuwait, Libya, Morocco, Syria, Tunisia, UAE, and Yemen. Moreover, post the addition of the longevity effect to the regression equation, these countries need to accumulate enough reserve for loan losses for at least three years. In the light of having two opposing teams in the literature, the thesis is more inclined towards the team supporting financial inclusion as having a positive effect on banks' stability but on the long term.

IV.b Recommendations

In order to mitigate for the impact of credit risk when initiating financial inclusion programs, governments are advised to approach microcredit program in a two tiered fashion, promoting productive self-employment by delivering credit to the poor for the purchase of capital input. In addition to the this, microcredit should deliver non-credit services such as social development programs such as vocational trainings, civil responsibilities and rights, information in health areas, and information sharing and monitoring among members. These non-credit services could be understood in a more general context hence called, Business Development Services (BDS) which creates valuable relationship between the borrowers and the financial institutions. In this regards, Grameen bank model sets an example. In order to increase repayment rates and control

the risk of extending loans under financial inclusion, the design of credit programs for the poor based on joint liability through peer selection, peer monitoring, and peer pressure are crucial to enhance repayment rates. In addition to this, the efficiency of group dynamics that are shaped by social ties and group homogeneity shall increase repayment performances. This is because social ties tend to increase social sanctions of peer pressure. Microfinance institutions can generate high repayment rates from the borrowers without the need for collaterals and group lending contracts. This can be achieved by the threat to refinance a borrower who default on obligation. Another tool could be to establish a collateral substitute that could act as an emergency fund. Regular repayment schedule can sustain high repayment rates as it works on screening out borrowers that are undisciplined at early stages and gives early warning for credit officers about future problems.

Seeing the repercussions of information asymmetry and moral hazard that arise from the extension of loans, credit bureaus could be the institutional answer to these problems. Information sharing assists the lender in better judging the risk profile of a potential borrower and provide incentives to have the borrower pay on time and narrowing the window for the former to access credit from other lenders. In this light, Credit Reporting Agencies (CRA's) will play a critical role in reducing information asymmetry and moral hazard by allowing more suitable interest rates and reflecting the actual risk of the individual borrower. Banks are also advised to alter their credit reporting regime by including full-file comprehensive reporting rather than negative only reporting. The former is said to widens credit opportunities to the private sector.

Credit Guarantee companies (CGC's) is considered to be a solution to enhance access to finance. CGC's are able to provide guarantees for MSME's without collaterals or track records to seek funding opportunities. They also cover a percentage of the risk besides their ability to remedy the financing gap which distinguishes economies in transition from other economies, that is the lack of usable collaterals. From a different perspective, financial inclusion and stability should be treated in a nexus where they should be healed by synergies rather than trade-offs. While financial openness instigates trade-offs between financial inclusion and stability, fiscal freedom, education, and deepening the credit information system should generate synergies between financial inclusion and stability.

One important factor that can contribute to the successful emergence of financial inclusion, is the overhauling of financial infrastructure. This could occur by enforcing transaction laws and the establishment of unified collateral registries. Moreover, it is recommended to remove interest caps, which should happen in a way that should not overlap with the general local economy. Furthermore, enhancing consumer protection against exploitative practices such as excessive fees on overdraft, lack of consumer redress and the miss-sell of financial products.

Countries challenged by low financial inclusion could gain from Fintech lending. This end could be achieved by deploying machine learning based credit rating that can bring significant disruption in the credit market. In this light, Fintech can reduce the time for credit decision and generate lower loan rates to existing borrowers.

The bank account information model could be deployed to improve default prediction. The model will be able to reduce credits costs and review times, furthermore, it won't be manipulated nor altered by the information provider for the purpose of tax returns or loan application. The emergence of such model will allow bank to calculate the loan's upper limit and in addition of having a grasp of the annual cash flow of the borrower, the bank will be able to make precise estimates of the amount a borrower can repay.

For banks to control defaults rates, banks are advised to increase the minimum payment which could reduce debt and further facilitating repayment burdens. However, policymakers will have to be cautious as increasing the minimum payment may have a double edged effect. The downside to this policy is that it tightens the short-run liquidity constrains which in its turn can increase the default rates.

IV. c Future Research

In the light of the above, seeing that a lot of the micro-finance practices can be used to control repayment rates and hence stabilize credit risk. The researcher shall further examine the impact of these practices on controlling credit risk when initiating financial inclusion projects empirically. Moreover, how these practices could be mainstreamed as part of the banks operations to enhance their stability and advance financial inclusion in their different economies.

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