PhD Thesis

ESSAYS ON FINANCIAL INCLUSION IN PAKISTAN

By

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17/PhD-ECO/PIDE/2014

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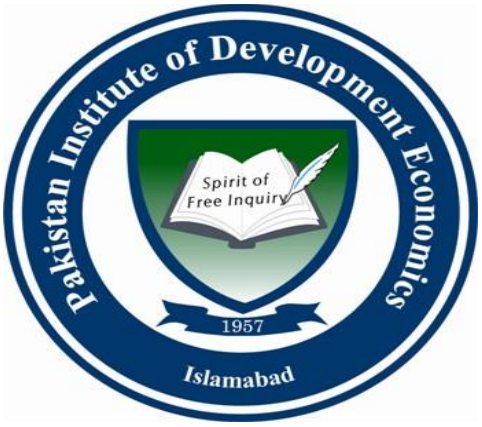

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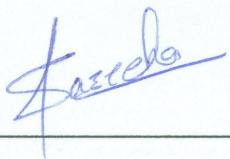
Students/Author Signature: 

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Dedicated to My Parents, My Husband & My Lovely Children;

Dr. Munazzam Adil

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your selfless love and sacrifices you made for me; for helping in all the ways you could during this challenging period. I dedicate this work to you and would never be able to pay back the affection and love that you extended to me.

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Here's to new beginnings!

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ADF	Augmented Dicky Fuller
AFS	Annual Financial Statement
AIC	Akaike Information Criterion
API	Application programming interfaces
APPB	Average Population Per Branch
ARDL	Autoregressive Distributed Lag
ATM	Automated Teller Machine
CAMEL	Capital, Asset, Management, Equity and Liability
CAR	Credit Adequacy Ratio
CFI	Center for Financial Inclusion
CGAP	Consultative Group to Assist the Poor
DFA	Digital Financial Application
DFS	Digital Financial Services
ECM	Error Correction Model
e-KYC	Electronic Know Your Customer
FAS	Financial Access Survey
FIP	Financial Inclusion Program
FSP	Financial Service Providers
GDP	Gross Domestic Product

GFC	Global Financial Crisis
GMM	Generalized Methods of Moments
HBL	Habib Bank Ltd
IBFT	Interbank Fund Transfer
IVR	Interactive Voice Response
KPK	Khyber Pukhtun Khawa
KPMG	Klynveld Peat Marwick Goerdeler
MFCG	Microfinance Consensus Guidelines
MFI	Monitory Financial Institutions
MNO	Mobile Network Operator
NADRA	National Database and Registration Authority
NI	Net Income
NPL	Non-Performing Loan
OECD	Organization for Economic Cooperation and Development
OTC	Over The Counter
POS	Point Of Sale
RBI	Reserve Bank of India
SBC	Schwarz Bayesian Criterion
SBP	State Bank of Pakistan
SMS	Short Message Service
SWOT	Strengths, Weaknesses, Opportunities, and Threats
USSD	Un-Structured Supplementary Service Data

ABSTRACT

Financial inclusion is the process to include the people who lack formal financial services. The concept of financial inclusion emerged globally in the times of the millennium, defined as the availability and usage of formal financial services, it essentially measures economic growth. The financially included individuals can invest in business, education and entrepreneurship which can pave way to poverty alleviation and economic development

Although it is not rational to assume that all individuals have a preference for using mainstream banking services compared to use of cash, it still is essential to provide them equal opportunity and access to banking services. Thus, the role of banking services, credit and debt in the modern times cannot be disregarded and all players, including market can benefit from the use of formal financial services properly.

Despite the current focus of policies and regulations devoted to enhancing access to finance in Pakistan, there are number of underlying factors causing financial exclusion. The main goal of the study is to identify the factors that determine the level of financial inclusion in Pakistan and suggest policy measures to improve the level of inclusion. In connection to this purpose, this study adopts a holistic approach & investigates, for the very first time, the Financial Inclusion Process for Pakistan from two perspectives; Financial Inclusion from both demand & supply side & the Impact of Financial Inclusion on the Credit Risk of Banking Sector; All, seminal investigations for Pakistan.

The ***first essay*** *of this study investigates the predominantly neglected dimension of financial Inclusion; the Demand Side of Financial Inclusion; This study employs number of indicators of demand side for Pakistan; using the emerging Evidence based approach of combining theoretical insights with data & employing econometric technique of ARDL with the help of time series data (1973 – 2017) for financial Inclusion determinants, micro determinants of banking sector, comprising of four categories of Banks and macro determinants, we measure the dimensions of demand side, Usage and Barrier; from two perspectives; The Banked (Usage dimension) and The Unbanked (Barrier dimension) segments of society. The Unbanked side is further analyzed by bifurcating it in Voluntary Barrier to Financial Inclusion and Involuntary Barrier to Financial Inclusion. We further develop an index for demand side of financial Inclusion.*

The empirical findings suggest that voluntary barriers to Financial Inclusion have a more negative or deteriorating effect as compared to involuntary barriers in Pakistan. This is an important finding of the study as latest literature on Financial Inclusion also focusses on the phenomenon of self-exclusion. From the results it is evident that the Banking determinants stand out with greatest impact on Financial Inclusion which is positive and reinforcing in nature. Thus, the onus of Financial Inclusion lies on Banking Industry where the demand portfolios and micro determinants contribute to Financial Inclusion process.

*The **second essay** of this study gives the Supply Side of Financial Inclusion the due focus and investigates the financial inclusion process for Pakistan by supply side – the top down approach by employing number of indicators of supply side; measures the supply side dimension of Access, a first time secondary data measurement by using time series data (1973 – 2017) of all bank types of Pakistan.*

The results signify that improvement in soft consumer loans reinforces financial inclusion and increase in low sized, no frill advances contribute to the Financial Inclusion

*The **third essay** of the study performs a broad-based assessment of Credit Risk & financial inclusion nexus by using a panel of 48 banks of Banking sector of Pakistan and employing approx. 1,000 balance sheets over period of 2001 to 2017.*

Using logit discriminant analysis this study develops a multifactor model which presents the relationship between the NPL's; a measure for credit risk of banks and bank's sensitivity to financial Inclusion determinants of supply side. The process is such where changes in financial Inclusion factors and bank sensitivity to those changes affect the NPL's, and NPL's in turn impact the probability of bank's higher credit risk. The multi factor model constructed in this study has the specification of the indirect test that uses estimated NPL to Gross advance ratio calculated from estimated changes in financial Inclusion determinants and banks sensitivities to those financial Inclusion variables as proxies of financial Inclusion factors

We investigate for Pakistan the impact of financial inclusion upon credit risk; where 16 percent are financially included & 85 percent of these 16 percent are served by banking sector; whether credit risk of banking sector increases or decreases due to financial inclusion; determine whether financial Inclusion is less risky-sound investment or high risk-bad investment for banking sector of Pakistan.

The exploration model of credit risk of the stylized Banking sector of Pakistan develops on the rationale that supply-side financial Inclusion conditions play a formidable role in determining the credit risk level. We believe that NPL's (measure of credit risk) are highly affected by financial Inclusion factors, bank specific variables and the micro determinants of risk; Capital, Asset, Management, Equity and Liability (CAMEL) category characteristics. In this context, we also evaluate the "Volume of Financial Inclusion" & "Quantitative frequency of financial Inclusion" for Pakistan.

The exploration model results depict that NPL are highly affected by financial inclusion determinants of supply side and micro characteristics. The study put forth a strong evidence that Pakistan's banking sector displays considerable credit risk due to greater probability where relationship of financial inclusion with credit risk is negative in nature. The risk assessment depicts a very stylized banking sector which experiences substantial levels of credit risk due to piling up of NPL's overtime.

*The **fourth essay** of this study offers an Evidence-Based-Way-Forward Approach for digital financial inclusion in Pakistan by providing an extensive overview of digital lending & Fin-tech eco-system of Pakistan; performs a qualitative SWOT assessment of economic, demographic, branchless banking & technological landscape, conducive for the penetration and growth of fin-tech in Pakistan. We define the Digital Maturity Matrix for Pakistan inclusive of Tech & Touch Spectrum of existing Fin-Techs of Pakistan and also tap upon the environment that is required to be constructed for Pakistan to exploit the full potential.*

INTRODUCTION

- **a) Background**
- **i) From Financial Exclusion to Financial Inclusion**

"Financial exclusion is a process where people experience problems accessing and using financial products and services in conventional market that are suitable to their needs & empowers them to live a regular social life in the society (Euro Commission, 2008) or "financial inclusion implies individual's ability to gain access to and effectively utilize appropriate conventional financial services and products (Clark et al, 2005).

Financial exclusion is a rather newer concept, initially introduced in 1994 to explain the withdrawal of financial services and stakeholders essentially from underprivileged localities (Leyshon 1994). Other researches concentrated on other phenomenon's of preferences and individual factors (Rowlingson 1994). The concept of financial exclusion in actual sense is part of the broader phenomenon of "Service Exclusion" which is an "exclusion from a wide range of services" (Gordon et.el, 2000). Discursively, service exclusion in turn forms a dimension of a larger phenomenon of "Social exclusion" that is non-participation in key social activities of the contemporary society (Gordon et al 2000; Walker and Walker 1997). It is from "social exclusion" the financial exclusion emerged; a multidimensional and dynamic process where individuals continuously move in and out of exclusion over a period of time; though the experience is relatively more persistence for some (Kempson and Whyley 1998).

As a parallel stream, the related concept of Financial Inclusion emerged from the ideology of "right of social citizenship"; based on the convention of Marshall (1950), three fundamentals of citizenship were identified; civil citizenship; political citizenship and social citizenship (Lister 1990). The concept was then enhanced by Rogaly (1999) in shape of "economic citizenship" which encompasses the right of accessibility of financial services and products.

❖ **ii) Financial Inclusion: International & Local Perspective**

Globally the populace that is financially excluded is predominantly in developing countries, with only 41 percent adults having a formal account; only 37 percent of females holding formal account against 46 percent of men; the gender parity further widens because of varying income inequalities among developing countries. For high income countries, account based financial inclusion is much greater with 89 percent of adults holding accounts with formal entities.

Pakistan's financial landscape poses a grim picture of limited financial inclusion. In cross country comparison, Pakistan was ranked the lowest in context of financial inclusion not only in the region but also worldwide when juxtaposed with developing countries with similar demographic and socio-economic profiles. The financial inclusion deprivation in Pakistan is evident from the "Access to Finance Survey 2015" (SBP) which states that "Only 16 percent of the population is financially included….nearly 50 percent of people save yet only 8 percent entrust financial institutions with their monies; one third of people borrow but just 3 percent borrow from mainstream financial institutions; international remittance have risen by 29 percent since 2001 but only 2.3 percent Pakistanis sent/received remittances. Vast majority of women stand excluded from financial system. Thus, there is a dire need for financial sector to incorporate processes and informal channels to enhance financial inclusion to marginalized sections of Pakistani's society. The concept of financial inclusion drive is lately put forth by SBP, with intention of promoting access to financial services and literacy to low-income residents and business facing exclusion from commercial banking. This perspective is essentially learned from the experiences of advanced economies. SBP has taken an active interest in gauging the level of financial access by conducting two comprehensive primary based surveys in the form of *A2F 2008 & 2015* along with recent implementation of financial literacy program in collaboration with ADB.

❖ **b) Rationale of the Study**

This study adopts a holistic approach & investigates, for the very first time, the *Financial Inclusion Process for Pakistan* from two perspectives; *Financial Inclusion from both demand and supply side and the Impact of financial inclusion upon Credit Risk of Banking Sector;* All, seminal investigations for Pakistan**.** Unlike previous international studies this study uses not only financial inclusion determinants but also the *Macro-economic factors, Financial development indicators and Micro determinants of the stylized banking sector of Pakistan by building a micro-linked macro exploration model*.

The *First essay* of this study investigates the predominantly neglected dimension of financial Inclusion; the *Demand Side of financial inclusion*; the bottom up approach that reinforces the phenomenon that there is a requirement to comprehend financial Inclusion in a continuum where provision of services do not indicate access; nor access entails a significant use of services. Incorporating this phenomenon, this study employs number of indicators of demand side for Pakistan; Using the emerging *Evidence based approach* of combining theoretical insights with data & employing econometric technique of *ARDL;* we measure the dimensions of demand side, *Usage* and *Barrier;* from two perspectives; *The Banked (Usage dimension)* and *The Unbanked (Barrier dimension)* segments of society. The Unbanked side is further analyzed by bifurcating it in *Voluntary barrier to financial inclusion* and *Involuntary barrier to financial inclusion*. We also develop an *index* for *demand side of financial Inclusion*.

The *second essay* of this study gives the *Supply Side of financial inclusion* the due focus and investigates the financial inclusion process for Pakistan by supply side – the top down approach by employing number of indicators of supply side; measures the supply side dimension of *Access*, a first time secondary data measurement by using data of all bank types of Pakistan.

The *third essay* of the study performs a broad based assessment of *Credit Risk & financial inclusion nexus* by using a panel of 48 banks of Banking sector of Pakistan, employing approx. 1,000 balance sheets over period of 2001 to 2017; evaluates whether credit risk of banking sector increases or decreases due to financial inclusion; whether financial Inclusion is less risky-sound investment or high risk-bad investment for banking sector of Pakistan.. Using logit discriminant analysis, this study develops a multifactor model which presents the relationship between the NPL's; a measure for credit risk of banks and bank's sensitivity to financial Inclusion determinants of supply side. The process is such where changes in financial Inclusion factors and bank sensitivity to those changes affect the NPL's, and NPL's in turn impact the probability of bank's higher credit risk.

The *fourth essay* of this study offers an *Evidence-Based-Way-Forward Approach* for Digital financial inclusion in Pakistan by providing an extensive overview of digital lending & Fin-tech eco-system of Pakistan; performs a qualitative *SWOT* analysis of *economic, demographic, branchless banking & technological landscape*, favorable for growth and penetration of fin-tech in Pakistan & defines Digital Maturity Matrix for Pakistan.

- **c) Significance of the Study**

This study tends to analyze financial inclusion from a broad perspective, considering it a process that ensures that majority have availability of financial services and products and use of finance is in a deeper and wider context. In broader sense, consumers in financial markets comprise not just the vulnerable and disadvantaged groups but literally everyone in the society. Financial inclusion just does not mean opposite of "Financial Exclusion", it goes beyond and is more profound in meaning. Demirgu-Kunt and Klapper (2012) term Financial Inclusion as circumstances that exhibit broader access of financial services without price/non-price impediments to their use. As

per Chakarvarty and Paul (2013) Financial Inclusion is deliverance of financial system of an economy to its participants and members and consider it synonymous with banking inclusion.

Our study embraces a multipronged approach and not only investigates Inclusion output of the financial system for major stakeholders of the economy but explores the bigger question of *Impacts of Financial Inclusion on Non-Performing Loans of Banking Sector of Pakistan*, evaluates the *"Volume of Financial Inclusion"* & *"Quantitative frequency of financial Inclusion"* for Pakistan. The exploration model of credit risk of the stylized Banking sector of Pakistan develops on the rationale that supply-side financial Inclusion conditions play a formidable role in determining the credit risk level. We believe that NPL's (measure of credit risk) are highly affected by financial Inclusion factors, bank specific variables and the micro determinants of risk; Capital, Asset, Management, Equity and Liability (CAMEL) category characteristics.

Our study also considers the future directions suggested by prior studies (Cámara and Tuesta) and incorporates new channels like *Electronic money, Super Inclusion of Up market and Collateralized portfolios*. Employs the emerging "Evidence based approach" to the first & the fourth essay. We define the *Digital Maturity Matrix* for Pakistan inclusive of *Tech & Touch Spectrum* of existing Fin-Techs of Pakistan.

- **d) Gap in Literature**

Number of studies tried to establish the root causes, repercussions and possible solution concerning Financial Exclusion, but majority of studies are either cross country investigations or single country where socio-economic landscape considerably differs from Pakistan.

The most cited and most recent cross country analysis of developing Asian economies is done by Park and V. Mercado, Jr (2015) where they study Financial Inclusion determinants and investigate relationship among inequality, poverty and Financial Inclusion and find that demographic

determinants like age dependency ratio, literary rate along with per capita income and state of law impact Financial Inclusion process of developing Asia. Their study is essentially based upon indicator of financial access formulated by Honohan (2008) who used these indicators to study the impact of country specific characteristics like population density, age dependency ratio and gross national income on the Financial Inclusion process of 160 countries. The results exhibited that economic instability, greater income inequality, weaker rule of law, regulatory restrictions and social impoverishment considerably effects and decreases financial access.

Apart from cross-country analysis there are also country specific studies performed to establish Financial Inclusion determinants. Kumar (2013) identified the state of Financial Inclusion in India by dynamic GMM and panel fixed efforts. He concluded that branch network level significantly and positively impacts Financial Inclusion. He further added that ease of access and geographical region are also the determining factors of financial inclusion level in certain segments of population. Camara and David (2015) used survey's micro data for country level study of Peru and found that vulnerable segments like rural population and female stand more excluded in using financial services. They also found that gender, age, income level and education also impacts individual perspective whether to avail financial services or not. Sarma (2008) derived *Financial Inclusion index* but was unable to define a common determinants for all the countries due to diversity in country specific regulations as characteristics and preferences giving way to financial inclusion greatly differ among countries (Kempson et al, 2004; Sinclair et al, 2009; Kendall et al; 2010; The World Bank, 2008). Despite these researches, literature still lacks information on the determining factor of financial inclusion in Pakistan.

Most scholars adopted *Global Findex Database* for understanding the financial inclusion process around the world (Demirguc – Kunt and Klapper, 2012; Demirguc-Kunt, et al, 2013; Efobi, et al, 2014; Camara and Tuesta, 2015; Tuesta, et al, 2015; Mohammad et al, 2017 Allen, et al. 2016). Demirguc – Kunt and Klapper (2012) researched individual behavior in terms credit, payments, saving and risk management based on Findex Data of 148 countries. Other researchers used survey data; Fungáčová and Weill (2015) studied Financial Inclusion process for China using individual data of 2011 survey and found that Financial Inclusion shows association with individual characteristics. Conversely, Swamy (2014) analyzed relationship among Financial Inclusion, economic development and gender by using household survey data of India. Corrado and Carrado (2015) employed extensive data of "Life in transaction survey" conducted in Europe during 2008-2010 global crisis and showed that Financial Inclusion likelihood is dependent upon household's economic, social and demographic aspects. However little work till date has been done to identify Financial Inclusion by secondary data and country specific characteristics. Explicitly, current literature mainly focusses only on the individual features to recognize the financially excluded ones. Macro determinants and their role that provide the background for understanding micro-level factors of financial inclusion have gained little attention. Further, there exists little attempts to model and realize Financial Inclusion in a holistic way. This study therefore attempts to plug these gaps.

The most common measure of "financial inclusion at country level is *Global Findex %* of population having an account with bank or financial institutions. Since, this is a study for Pakistan, a single country study, instead of *Global Findex data*, this study uses composite portfolios of deposit and advances as dependent variables for measuring financial inclusion. Considering total

deposits and total advances as proxy for Financial Inclusion is supported by previous studies such as Beck et al. (2007), Honohan (2008) and Amidzic, et al, (2014).

The prime aim of this research is to establish how bank-specific factor influence the use of banking services by population. In this context two separate models are developed to depict both the demand side (depositor) and supply side (borrowers) of financial inclusion. The demand side of financial inclusion comprises of dimension of usage and barrier whereas the supply side of financial inclusion comprises of dimension of Access.

❖ **e) Why Focus on Formal Banking Sector? Microfinance: a Silver Bullet?**

One of the major critiques to MFI is that it is an ineffective and partial response to dismantling financial exclusion. Despite the fact that microfinance is a strong tool for inclusive development of poor, Microfinance has failed to bring people out of poverty, the most celebrated story of microfinance "Grameen Borrower are staying poor" (Neff 1996). Rather it is well evidenced that realistically Micro-finance does not serve the destitute, the poorest of poor, as they are risky audience; serving them undermines the principal of cost recovery so they end up excluded.

Literature also highlights the consequences of commercialization of Microfinance overtime, which derailed MFI's from the prime objective of "taking poor people out of poverty". Increased pressure of commercialization have led MFI's "driving poor into high indebtedness and then increasingly pressurizing debtors with questionable debt collection methods" (Erika and Kinetz 2012). Studies also confirmed commercialization and price control absence inducing MFI's to charge worldwide, an average interest rate of 25-30 percent (CGAP Report, 2006).

The critical voices on Microfinance were highly emphasized by "The Microfinance Consensus Guidelines MFCG". The key principles of MFCG, concerning the weaknesses of MF were that "Microcredit is not always the answer"; "Poor segments require multiplicity of financial products

and services, not just the loans"; "Poor people get hurt by interest rate ceilings as it makes it harder for them to avail credit"; "The task of the Govt. is to act as an enabler of financial services through formal banking sector". Further, in line with Washington Consensus declaration, the CGAP guide lines "have trust deficit in managerial skills of Microfinance and Govt. to act proficiently and placed the incidence of burden on government to set up rules of the game and conductive environment by propagating the formal banking sector for promoting financial inclusion".

This study also endorses this concept by placing critical thrust of this research of financial inclusion (demand & supply side of financial Inclusion) on formal banking sector of Pakistan. However, like Microfinance, certain inherent impairments also hold for Pakistan's banking sector as well where a "*stylized banking sector"* functions under *monopolistic competition*; Where *government, deliberately performs the crowding out of private investment by diverting the portions of credit of private sector to its deficit financing; Where banks have a revealed preference for lending gigantic risk-free loans to government-their connotation of improving Credit adequacy ratio (CAR); Where banks' lending behavior is skewed toward selected corporate /sectoral giants; Where public sector banks are willing to finance and bail out loss making public enterprises; all happening in a sector which exhibits serious issues of corporate governance & risk underpricing.*

f) Organization of the Study

The rest of the study is organized as follows: *Chapter 1* describes the financial Inclusion output of banking sector-demand side analysis which contains brief introduction, literature review, analytical framework, data and variables and conclusion of chapter. *Chapter 2* on the same pattern is about the financial Inclusion output of banking sector-supply side analysis. Chapter 3 explains the financial Inclusion and credit risk nexus whereas Chapter 4 explore the Fintech and digital lending landscape in Pakistan.

"Determining the Financial Inclusion Output of Banking Sector of Pakistan: Demand Side Analysis"

Essay 1

1.1 INTRODUCTION

1.1.1 Introduction

The concept of financial inclusion emerged globally in the times of the millennium, defined as availability and utilization of formal financial services, it essentially measures economic growth. The financially included individuals can invest in business, education and entrepreneurship which can pave way to economic development and poverty alleviation (Beck, et al, 2007; Bruhn and Love, 2014).

Although it is not rational to assume that all individuals have a preference for using mainstream banking services compared to use of cash, it still is essential to provide them equal opportunity and access to banking services. Inevitably, people with vulnerable status and low income will always exist who live in underprivileged areas without any bank branches. However, it's no legitimate reason for not providing regular banking facilities to them. Thus, the role of banking services, credit and debt in the modern times cannot be disregarded and all players, including market can benefit from utilization of formal financial services properly.

In particular, the demand side of financial inclusion offer prospects to individuals who can enhance financial stability by saving and depositing in banks for harder times (Han and Melecky, 2013). Higher deposits at banks not only provides financial stability and security to individuals but also contributes to the economic development of country. Moreover, ready and reliable obtainability of financial services and products are required by individuals to raise their standard of life. Savings, credit, payment, insurance and transfers services are now inevitabilities of modern times.

Though financial inclusion remained a priority over the years, the policy & approach regarding

financial inclusion has remained questionable, essentially, showing bias towards financial Inclusion of the supply side. Empirical literature depicts that measurement of financial inclusion has been primarily done by the "Access" dimension by employing aggregate data of the supply side (e.g Honohan (2007); Sarma (2008, 2013); Chakravarty and Pal (2013) and Amidzic et al 2014). The only seminal study relying on data of the demand side-individual level was by (Demirguc-Kunt and Klapper, 2013).

However, Access and Usage "are necessary but not sufficient conditions for inclusion of financial system". Greater Access and Usage does not essentially imply greater level of financial inclusion; increased access fosters financial inclusion when the levels of access are lower than the threshold: beyond threshold a greater access only leads to enhanced frequency in the use of financial services (Camara and Tuesta, 2014). Due weightage to demand side of fin. Inclusion is an obligation.

1.1.2 Research Objective

- To establish the determinants of financial Inclusion–demand side for Pakistan through the mainstream banking sector
- To analyze the impact of voluntary fin. Exclusion on the financial inclusion process for Pak.
- To explore the impact of involuntary financial exclusion upon the financial inclusion process for Pakistan.
- To explore the impact of usage dimension upon the financial inclusion process for Pakistan.
- To determine if the Banking Sector of Pakistan is inclusive per se.

1.1.3 Significance

In prior global researches, financial inclusion is predominantly measured from supply side. The only work; a cross country investigation relying on demand side data at individual level was performed by Demirguc -Kunt and Klapper (2013).

The contribution of this study is twofold. First study will investigate, for the very first time the financial inclusion process for Pakistan at individual level by demand side – the bottom up approach, far refined than the supply side – top down approach that ignores the individuals and banking cliental. Further this study employs large number of predictors from demand side; measures demand side from two perspectives; the banked (usage dimension) and unbanked (barrier dimension) segments of society. We construct the *"Dimension of Barrier"* by using *Evidence based approach (evidence for policy design)* where we identify multiple barriers to financial inclusion, based on evidence in Pakistan. The barrier dimension (unbanked side) is further analyzed by bifurcating it in *Voluntary barrier* to financial inclusion and *Involuntary barrier* to financial inclusion; again, seminal measurement for Pakistan.

Moreover unlike previous studies this study uses not only financial inclusion determinants but also the macro-economic factors, financial development indicators and micro determinants of the stylized banking sector of Pakistan by building a micro-linked macro exploration model where Inclusion output of the financial system is computed from macro & financial variables, demand side – Usage & Barrier variables (Voluntary financial Exclusion & In-Voluntary financial Exclusion) of financial Inclusion & banks demand side determinants of financial Inclusion.

Another significant contribution of the study is that this study considers the future directions suggested by prior studies (Cámara and Tuesta 2015) and incorporates new technological channel like *Electronic money* by including information on internet and mobile banking in the usage dimension; an area only covered in survey (AFS) but not modeled empirically for Pakistan till date. Also, the very emerging concept of *Super Inclusion* of high end market (Leyshon et al 2010) is also incorporated and will be measured for the first time for Pakistan.

Concerning financial inclusion, major cross-country researches on financial inclusion used the World Bank data base, known as *Global Findex* (Global Financial Inclusion Data Base) based on survey data comprising of annual Gallop World Polls. The data is less authentic for a number of reasons like supply side indicators for financial inclusion are not measured by this data base, research methodologies for data collection is telephonic interview and randomly selected 1000 respondents per country. On the contrary this study employs an extensive, authentic, secondary data base of *State Bank of Pakistan* in form of *Statistic on Scheduled Banks in Pakistan* and *Hand Book of Statistics on Pak Economy*.

1.2 REVIEW OF LITERATURE

1.2.1 Demand Side of Financial Inclusion

Literature suggests that only focusing on Access and Usage dimension leads to restricted measurement of financial inclusion. The financial inclusion measurement should be considered from two angles. At first, to account for inclusiveness, *banked* side is considered by measuring the dimensions of access and usage. On the other, the *Un-banked* side can be explored by measuring the dimension of *Barrier*. The Barriers comprises of both the Voluntary Financial Exclusion and Involuntary Financial Exclusion.

1.2.2 The Dimension of Barrier

A. Voluntary Financial Exclusion

Financial Exclusion is much more complex and multifaceted than a simple case of geographic exclusion or outright refusal by the banks. The question whether segments of society are excluded by banks or they opt out of financial system by preference and choice has been asked earlier in literature even before the phenomenon of financial exclusion and inclusion surfaced (e.g. Berthoud and Kempson 1992; Toporowski 1986). The seminal work suggested that barriers on both sides-

financial institutions and consumers are important in deciding financial inclusion. In continuation, literature explains a crucial aspect of self-exclusion as the inclination for non-main stream services (Ford and Rowlingson 1996) namely subprime credit market. According to (Kempson et al 1994) a number of researches found little evidence of rejection of credit application of low-income families by banks. As per Ford and Rowlingson (1996), these individuals may have options of mainstream credit available to them but they nevertheless choose to lend from sub-prime markets. Thus, people make choices between different alternate credit options available, though options are limited and restricted. Literature terms the use of informal credit services because of outright denial of loan by banks as a case of the "Culture of Poverty" (Lewis, 1966).

Formal credit types are often inappropriate for low income segments because of high minimum loans offered and also inflexible and high installments and repayment rates (Collard and Kempson 2005). Research also points out that low income group prefer managing finances on weekly/fortnightly basis and in cash for purpose of having control over budget (Jones and Barnes 2004, Whyley et al 1998).

The affected customers then *"have to search outside the mainstream market system to fulfill their financial service's requirements, to subprime market"* (Leyshon and Thrift 1997). Thus this market is viewed as catering the requirements of two distinctive groups; ones on low income (Kempson et al, 2000) and those who do not have access to formal banking because of low or impaired credit history, but possess the capacity to repay mainstream credit. In other words the subprime market users may have run out of their main stream options before utilizing sub-prime credit (Kempson and Whyley 1999).

Thus, not only banks proactively pursue exclusionary process; consumers essentially impact the process as well by suspending the inappropriate products and services and choosing the ones that

meet their needs in best manner. Thus, use of subprime markets depicts one feature of "culture of poverty" or "habitus" where choices are not "entirely based upon people's incomes but also their "Values, belief and tastes" (Le Grand, 1991).

However, it's simple to think that routines and traditions are the only deciding factors. As per Ford and Rowlingson (1996) "Cultural traditions, practices and custom influence the utility of financial services/resources, as well as evidence of strategic decisions making of households as to which institutions ensure provision of the services that are required by them and in a shape which empowers them to increase & manage their resources".

As per literature one of the main determining factor of Voluntary financial exclusion is the "barrier of lack of money". Literature regards small income as the prime aspect negatively influencing the account holding level; derived from hostile social conditions like unemployment; being single parent; sickness etc. However, lack of money justifies for a certain percent of non-account holders kept out of financial system; not all holders of account are refused access to services due to lack of money. Another negative consequence of lack of money/low income is that it leads to closure of accounts. People with drop in income prefer account without overdraft access (Kempson) in case they unintentionally become over drawn.

Another determinant of Voluntary financial exclusion is the "barrier of lack of access to financial services". Speak and Graham (2000) found out that individuals start turning away from banking services when banking services are physically difficult to access due to banks discriminatory policies and super inclusion of high-end cliental. In this context, Leyshon and Thrift (1998) suggested: "More wealthy social sections are a process of "Super inclusion". Their power of money result in being offered to them greater service provision and increased levels of information. However the corollary of the very course of inclusion is that it makes poorer people subject to

increasing financial exclusion as they don't exhibit the database statistical characteristics mandatory by procedures" (Leyshon et al 1998).

Thus, excluded people are "doubly handicapped" as they are under "informational and financial shadow". So, literature identifies two "distinguishing ecologies of financial service use and production", where affluent class spaces show comparatively higher intensities of financial access, usage and formal information of banking sector; whereas poor class areas are reversed in this aspect.

Further this barrier of lack of access has given rise to an increasingly polarized population in the developing economies, in the context of accessing the new technological dimensions of electronic economy. Those who fall in any of the category of low income, unemployment, poor credit history and retired are least likely to take part in the society without cash (credit cards, plastic money, internet banking etc.). Therefore, while new developments of e-banking overcome the barriers of distance, people living in bad micro-geo-graphics have greater chances to be impacted by geo-exclusion & least likely to be taking advantages of the financial developments (Pahl, 1999).

Substantial attention by researchers is also given to another barrier; the "barrier of Inappropriate Product". The in-appropriate products of banking sector lead to non-account holding as banking products are in-appropriate for certain group of potential customers. As suggested by Kempson and Whyley, "The needed credit facilities for the short term are small, fixed term loans compared to revolving credit, automatic and fixed payments, that makes use of technological advancements to enable lower annual rates than are available currently from money lenders". However, the cost of smaller loan isn't less than a larger one. Suitable products, especially small amount loans are not available, or not directed towards financially excluded segments; for this reason, that fixed cost of lending will not decrease with a fall in loan amount. On the other hand, scattered smaller

amounts will increase banking costs as income inflow from these smaller loans will not cover the costs as "lending smaller loans to low income customers is costly and comes with a greater default risk" (Credit Union expansion report)

B. In-Voluntary Financial Exclusion

Leyshon and Thrift, (1993) identified "retrenchment" or geographical pulling out of formal financial services and financial institutes from disadvantaged areas. Despite rapid growth of financial structure globally, financial services retrenchment occurred as a response to physical recession of 1980's and 90's leading to social distancing by banks aiming for "leap to quality" & growth of "premium exclusionary commercial products" tailored for up market clientele. This happened with a parallel development of creation of a mass market of standard, transparent, low cost and safer financial products (Leyshon and Thrift 1995), hence discriminating implicitly against high risk-low earnings cliental by proposing them standard-low cost products, as described by Toprowski (1986) "The down market clientele are informally discouraged by constraining their right to use to banking services and formally by restricting the array of services for which they are eligible".

Therefore, instead of total exclusion of certain clientele from system, this resulted in a "Two-tier financial system" giving rise to two distinct markets; "Upper-market being hardly used by lower-income customers who comprise the main clientele base for lower-market financial services provision" (Berthoud and Kempson 1992). Processes of social distancing were later supported by developments in information technologies; enabling banks to acquire further accurate info about prospective customers, target cliental and improve risk assessment i.e., credit scoring (OFT, 1999: Rogaly1999). While the results were greater efficiency and higher availability of appropriate products for people, it also had implications of "loss of local contact "with clientele through wide-

ranging branches and resulting trust deficit between customers and bank staff "leading to particular social sections finding it very tough to avail financial products" (Leyshon et al 1998).

To win competition, the banking sector became more concentrated and profit oriented, inevitably leading to bank branches closure to cut cost. To gain higher profit, the prime activity of bank also shifted from providing of credit services to investment products and fee producing activities "thus target cliental turned out as people with higher incomes, net worth while non-profit bearing services were reduced and cut or charged fees". Some authors noted the biased effects of "Relationship and Priority Banking" or "Urban gate keeping" (Boddy 1980). As a result "micro-geographies of good and bad localities and customer got created (Leyshon et al 1998) by this strategy of risk avoidance implemented by financial services withdrawals from poorer areas (Conaty, 1993; Kuar and Mayo 1997; Layshon et al, 2008; Leyshon and Thrift 1997) due to creation of "pockets of greater concentration of economically and socially deprived individuals" (Kempson et al, 2000). The result is an extreme super inclusion of "more advantaged and wealthy social groups --------- [who] are in a position to pick and select from a greater variety of favorable products than ever before, whereas ones of the low market are ever more left behind in the context of attaining admittance to financial system" (Leyshon and Thrift 1996).

Concerning geographical exclusion there is a consensus in literature that "spatial dimension" of financial exclusion creates massive hindrance for residents of rural and urban deprived areas. Geographical exclusion also holds for rural areas based on operational costs of operating branches in low density population areas (Gentle and Marshall, 1992). Rather a deep-rooted phenomenon, the bank branch network distribution always showed signs of bank "services deprivation" in rural and other disadvantaged areas (NCC, 1983). The financial desertification" and "islands of exclusion where financial services for poor household are virtually non-existent" (Rossiter and

Kenway 1997). It is depicted by unequal branch distribution, continual closure of bank branches in predominantly by rural and deprived areas (Thrift and Leyshon, 1997).

According to studies, geographical exclusion has consequences in the shape of "Non account holding" where people refrain from availing them to an extent that people close down or suspend their accounts (Kempson and Whyley 1998; Kempson and Jones 2000) or hesitate to open account in the first place. Non account holding is not only triggered by the spatial dimension but also by gender (females highly financially excluded as per global stats) and education (financial illiteracy) and age (elderly people are less likely to use ATM machines compared to others (Kempson et. al. 2004; Kempson and Jones 2000; Kempson and Whyley 1999). The social distancing of financial services further creates psychological barriers of "Mistrust of Banks" as it makes people think that banking services" are not meant for them" (Kempson and Whyley 1999) and often make the assumption that banks stand "reluctant" to serve them (Kempson et al 2004). Others observed (Collard et al 2001; Leyshon et al 1998; Regan and Paxton 2003; Speak and Graham 2000) that feelings of lack of trust on main stream financial institutions is more wide spread among groups who are majorly excluded from financial system.

The mistrust needs not to be based necessarily on the individual experiences but can be based upon experiences of family, neighbors, friends, negative media projection of mainstream financial services provisions (Whyley & Brooker, 2004). Also second hand experience can be as powerful as of the customer themselves (Collard et al 2001).

1.2.3 The Dimension of Usage

"Increased use of financial services, product or extensive availability of accessibility points do not essentially imply that the system is inclusive per se" (Camara & Tuesta 2015) *The usage of formal*

financial services is considered as an output of financial inclusion rather than a measure of the inclusiveness of a financial system.

The usage dimension of demand side is conditioned by a number of socio-economic and macro factors like GDP per capita, legal frame work; human capital, cultural habits; infrastructure; ATM and number of banks (as per literature). The demographic indicators of saving and loan also show percent of adult population that is saving and own a loan in formal banking system (Camara and Tuesta 2015). Global Findex identifies financial service users as "individuals who own a bank account; use mobile banking yet don't have an account and individuals with debit or credit card but don't have an account".

Further research assessed the extent of usage by individuals under three different indicators "Keeping saving, having a loan in formal banking institutions and holding at least one financial product".

1.3 An Overview of Financial Inclusion in Pakistan

1.3.1 Highlights of Access to Finance Survey (A2F 2015): State Bank of Pakistan (SBP)

Since 2008, access to financial services in Pakistan has considerably increased, where 16 percent of population has accessibility to bank accounts (inclusive of mobile wallets) and 23 percent have accessibility to financial products and services of mainstream financial intermediaries, compared to 11percent and 12 percent in 2008, respectively; though still very low in comparison to other countries of South-Eastern Asia.

The *Access to Finance Survey (A2F 2015)* underlined several critical features of limited financial inclusion in Pakistan, such as: nearly 50 percent of people save yet only 8 percent entrust financial institutions with their monies; one third of people borrow but just 3 percent borrow from mainstream financial institutions; international remittance have risen by 29 percent since 2001 but

only 2.3 percent Pakistanis sent/received remittances. Vast majority of women stand excluded from the formal financial system".

The study created a rich data access to financial services including Analysis, Planning and Implementation of the Financial Inclusion Program (FIP). In cross-country comparisons conducted on the basis of the 2008-A2F, Pakistan was the lowest ranked country in the region, as well as when compared with countries with similar socioeconomic and demographic profiles.

The 2015 A2F survey highlighted the significant gender difference in access to credit in Pakistan: the survey found that females remained less likely to gain access to the overall financial sector, compared to men. Notably, fewer females attain access to banking services (5.5 percent vs. 21.1 percent men), Money Transfers (1.4 percent vs. 3.3 percent men) and Insurance (0.6 percent vs. 3.3 percent men).

Age factor possesses better probabilities of being served formally versus served informally i.e. younger population therefore presents an opportunity for banking industry. It shows an increase ratio of 18 percent in which mostly are 60+, whereas young age (< 30 years) decreases chances of being served formally, although with a relatively small impact. Education also shows growth rate of 19 percent in terms of formal financial inclusion. The primary complete shows banked of 4 percent. Illiterate shows 18 percent. The Poverty Index (19 percent). Provincial data depicts formal financial inclusion of: Punjab (15percent), Sindh (9percent), KPK (9) and Baluchistan (19 percent)

Urban area male (> 30 years), intermediate degree holders, self-employed or salaried workers and earning >Rs. 10,000 or more per month are relatively more likely to own a bank account. Since 2008, Physical Infrastructure (bank branches and ATMs) has gradually increased, thereby indicating the interest of the financial sector in extending its outreach. Mobile accounts, despite

growing at a high rate, are still rare; out of all respondents only 1.3 percent own mobile accounts. Mobile accounts predominantly belong to young and middle-income bracket.

Income, Education, Gender & Age, unlike, formal financial services do not advance individual's chances of utilizing informal financial services versus compared to being financially excluded.

The authors of the 2015 report concluded that financial access is hindered by higher poverty, along with lower consciousness of and info concerning financial services, as well as gender bias. It was suggested that the formal financial sector ought to align with and incorporate informal channels and processes to increase financial outreach to the marginalized sections of the population. Also, financial literacy shows a steady positive effect on usage of informal and formal financial services, making it a contender for center of future efforts regarding financial inclusion.

1.4 MODEL & METHODOLOGY

1.4.1 (A) Theoretical Motivation

Though financial inclusion remained a priority over the years, the policy & approach regarding financial inclusion has remained questionable, essentially, showing bias towards measurement of financial Inclusion.

Number of researches attempted to measure Financial Inclusion but showed biasness. Eight indicators were constructed by Demirguc-Kunt and Martinez Peria (2007) to measure financial outreach; ATM/Bank branches per capital and sq. km, number of deposit and loan accounts per capita, average deposit and loan sizes relative to GDP per capita. These indicators, seemingly complete, yielded correct information, if and only used together. A single indicator signifies nothing and stands incorrect e.g. Sarma (2008) found that Russia shows higher bank accounts per capita but fewer bank branches. Therefore, financial inclusion is a multifaced phenomenon, not to

be measured by individual indicators. Researchers then employed multi-dimensional index for measurement by defining and dividing indicators in multiple dimensions typically accessibility and usage (Samara, 2008). Chakarvarty and Pal (2013) used axiomatic approach for Financial Inclusion measurement which allows calculation of percentage contribution of multiple dimensions.

Venkataramani and Gupta (2012) refined the indicators and dimensions by involving indicators used by other researches. The dimensions included usage outreach, cost of transaction and ease of transaction. Arora (2014), unlike Sarma and Chakarvaty selected number of determinants for each dimension, expanding the reach of index. Arora measured financial inclusion in the framework of transactions and the dimension included "ease of transaction, cost of transaction and outreach".

However, empirical literature depicts that measurement of financial inclusion has been primarily done by the "Access" and "Usage" dimension by employing aggregate data of the supply side (e.g Honohan (2007); Sarma (2008, 2013); Chakravarty and Pal (2013) and Amidzic et al 2014). The only seminal study relying on data of the demand side-individual level was by (Demirguc-Kunt and Klapper, 2013).

"Financial Inclusion when estimated from supply side-the top down approach ignores perspectives of lower income households and small sized business. Measurement from demand side- the bottom up approach reinforces the existing measures of supply side to improve the scenario.

Therefore, relevant indicators from supply and demand side, data inclusion of two viewpoints of banked and un-banked should be investigated. However, access and usage are necessary but not sufficient conditions for inclusiveness of financial system. We hypothesize that only paying attention to access and usage results in restricted measuring of Financial Inclusion. In this context, individual demand side investigations that accumulate data on potential reasons that why

individuals fail to utilize formal financial products and services contributes essential information concerning the magnitude of inclusiveness of the financial system.

We presume that there are three dimensions which determine the magnitude of Financial Inclusion, usage, barriers and access. These dimensions are concurrently determined by various demand side characteristics for the dimensions of usage and barriers and country level supply side characteristics for access. Concerning demand side, Financial Inclusion measurement is approached from a two-sided perspective. On one hand, we consider the inclusiveness for the banked side by measurement of real use of financial services namely, inclusion output of financial system. On other hand, we take in information of the unbanked side to analyze the barriers of financial inclusion by the impediments perceived by individuals barred from using formal financial services.

1.4.1 (B) Evidence driven Approach- Integrating Evidence with Data

We employ *Evidence based approach*[1] by constructing the *Counterfactual Dimension of Barrier*, based on evidence for Pakistan. For Pakistan, the evidence clearly depicts that there exist multiple barriers to *full financial Inclusion, for opening account; after opening account, due to cost factor, financial illiteracy, lack of income, unemployment* etc. It's essentially not about *"Access"*, we can solve access, but access is not inclusion, and inclusion is really complicated-especially for vulnerable groups.

So, we focus on *Evidence based approach* and construct the *Counterfactual Dimension* of *Usage (The Banked)*; the *Dimension of Barrier (The Un-Banked)* by using following steps of *Evidence*

[1] The author of thesis is a *BCURE Trainer (Building Capacity Using Research Evidence) - J. F. Kennedy School of Public Policy-Program, Harvard University* and teaches *06 BCURE Modules* to *Civil Services of Pakistan*. The author attended *J.F Kennedy School of Public Policy, Harvard University,* on scholarship in 2018 for the high-powered *Evidence for Policy Design (EPOD)* Course of *Rethinking Financial Inclusion.* Currently the author is doing *The Public Policy & Leadership Credential* comprising of 06 courses of *Evidence-Based Approach* conducted by *Faculty of Harvard – Kennedy School of Public Policy*.

based approach:

- First, *think through theory, focus on developing, evaluating and refining theory of change.*
- Second, *Dive into Data;* combine theoretical insights with evidence which is essentially based upon following fundamental principles:
  - *Principle 1 - Understand what data tells you (and what it doesn't)*
  - *Principle 2 - Consider what's shown and what's not (No cherry picking of data)*
  - *Principle 3 - Know where the data come from*
  - *Principle 4 - Don't jump to conclusions*
- Third, consider *Political Economy*
- Fourth, *The Counterfactual*

So, by following structured approach, by integrating evidence with data, we focus on outcomes that matter. Earlier In financial inclusion, progress in Pakistan has historically been measured by focusing on proxy outcomes: *Policies enacted* and *Accounts opened.* In *Evidence based approach* of financial inclusion, we focus on outcomes we intrinsically care about which are; *Poverty reduction* and *Barriers.*

1.4.2 Econometric Methodology

Financial Inclusion - Demand Side Model

Co-integration is a powerful method of determining long run relationship and steady state equilibrium among variables. A number of co-integration techniques were devised to establish long run relationship amongst the time series. For all these co-integration techniques, there exists an important restriction that all series must be integrated of the same order, however, a co-integration approach, developed in recent times called *"Auto Regressive Distributive Lag (ARDL)"* approach proposed by Pesaran et al (2001), also known as bound testing. In contrast to

other co-integration approaches, Engle and Granger (1987); Johansson and Julius (1990), the ARDL is superior due to the fact that both short run and long run parameters of the specified model can be applied irrespective of the order of integration, whether the series under consideration are I (0), stationary at level or I (1), stationary at first difference. Owing to the convenience, the ARDL is extensively used in empirical works, especially multi-variant models. It is also employed to asset long run relationship in this study.

The ARDL approach comprises of following steps:

1. **Testing of Unit Root:**

   The testing of stationarity property is the natural start of time series analysis. It is essential to determine through formal tests whether time series data holds trend, whether trend is deterministic or stochastic one. Multiple tests are described in literature for testing of unit root of the series. The selection of unit root test is based upon nature of data. If data series is without structural break then ADF test is used. If structural breaks are suspected then we employ Zivot and Andrew test or Clemente et al (1998) test. However, we employ the standard version of *Augmented Dicky Fuller (ADF)* (Dicky, 1976; Dicky and Fuller, 1979) for checking the non-stationarity assumption.

2. **Specification of the Un-restricted Error Correction Model:**

   To investigate the relationship of dimension of usage, dimension of barrier and bank specific determinants of demand side with Financial Inclusion for Pakistan, we formulate an un-restricted Error Correction Model (ECM):

$$\Delta FINC\ OUTPUT_t = \varphi_0 + \varphi_1 \sum_{i=1}^{p} \Delta (BBR)_{t-i} + \varphi_2 \sum_{i=1}^{p} \Delta (S)_{t-i} + \varphi_3 \sum_{i=1}^{p} \Delta (E\text{-}BANK\ TR)_{t-i} + \theta_1 (BBR)_{t-1} + \theta_2 (S)_{t-1} + \theta_3 (E\text{-}BANK\ TR)_{t-1} + \mathcal{E}_t \qquad (eq\text{-}1)$$

$$\Delta FINC\ OUTPUT_t = \beta_0 + \beta_1 \sum_{i=1}^{p} \Delta (Y_{PER\ CAPITA})_{t-i} + \beta_2 \sum_{i=1}^{p} \Delta (UN\ EMP)_{t-i} + \beta_3 \sum_{i=1}^{p} \Delta (S_{INC}\ UP\ MKT)_{t-i} + \beta_4 \sum_{i=1}^{p} \Delta (S_{INC}\ UP\ MKT\ COLL)_{t-i} + \alpha_1 (Y_{PER\ CAPITA})_{t-1} + \alpha_2 (UN\ EMP)_{t-1} + \alpha_3 (S_{INC}\ UP\ MKT)_{t-1} + \alpha_4 (S_{INC}\ UP\ MKT\ COLL)_{t-1} + \pi_t \quad (eq\text{-}2)$$

$$\Delta FINC\ OUTPUT_t = \lambda_0 + \lambda_1 \sum_{i=1}^{p} \Delta (RURAL_{POP})_{t-i} + \lambda_2 \sum_{i=1}^{p} \Delta (FE_{POP})_{t-i} + \lambda_3 \sum_{i=1}^{p} \Delta (AGE\ GP_{C\&O})_{t-i} + \lambda_4 \sum_{i=1}^{p} \Delta (FIN\ ILL)_{t-i} + \lambda_5 \sum_{i=1}^{p} \Delta (RQI)_{t-1} + \mu_1 (RURAL_{POP})_{t-1} + \mu_2 (FE_{POP})_{t-1} + \mu_3 (AGE\ GP_{C\&O})_{t-1} + \mu_4 (FIN\ ILL)_{t-1} + \mu_5 (RQI)_{t-1} + \delta_t \quad (eq\text{-}3)$$

$$\Delta FINC\ OUTPUT_t = \eta_0 + \eta_1 \sum_{i=1}^{p} \Delta (DEP\ F_{INC}\ TOT)_{t-i} + \eta_2 \sum_{i=1}^{p} \Delta (DEP\ MFI)_{t-i} + \eta_3 \sum_{i=1}^{p} \Delta (DEP\ ROI)_{t-i} + \eta_4 \sum_{i=1}^{p} \Delta (DEP\ PER\ SOA)_{t-i} + \eta_5 \sum_{i=1}^{p} \Delta (DEP\ PERSONAL)_{t-i} + \gamma_1 (DEP\ F_{INC}\ TOT)_{t-1} + \gamma_2 (DEP\ MFI)_{t-1} + \gamma_3 (DEP\ ROI)_{t-1} + \gamma_4 (DEP\ PER\ SOA)_{t-1} + \gamma_5 (DEP\ PERSONAL)_{t-1} + \sigma_{it} \quad (eq\text{-}4)$$

Since we are not restricting the coefficients, Pesaran et al (2001) termed this as unrestricted/unconditional error correction term. The L.H.S of the equation (1) represents the measure of "Financial Inclusion-Demand Side". The expressions (θ_1- θ_n) on the R.H.S correspond to long-run relationship among the variables. Remaining expression with summation sign (φ_{11}- φ_n) correspond to short run-dynamics of model. φ_0 represents drift component whereas e_t is the Gaussian white noise. The same applies to all equations.

3. **Selecting Appropriate Lags:** A crucial is determination of appropriate lag length as auto-regressive models are sensitive to lag structure and stability of the model essentially depends upon "Optional lag length". Time series literature strongly establishes that Gaussian error, which is free from econometric issues like auto, hetero, non-normality is ensured by appropriate number of lag. Empirical literature of time series depicts variety of criteria for lag length selection, generally optimal number of lag is decided on the basis of AIC or SBC values. Normally for annual data 1 or 2 lags are enough.

4. **Serially Independent Error:** This step is essential as the requirement of ARDL methodology is "Gaussian error", so it is crucial that error must be serially independent, otherwise it may affect the choice of optional lag length. Thus, we test auto correlation, heteroscedasticity, normality and functional form to ensure the presence of Gaussian error.
5. **Dynamic Stability:** Ensuring the dynamic stability of the model is essential as Autoregressive model are highly sensitive to lag length, sample point, number variables. Brown, Durbin and Evans (1975) suggested CUSUM & CVSUMQ for stability of model in case of OLS.
6. **ARDL Co-integration Test –The Bound Test:**

   The ARDL test for co-integration is based upon Wald Test (F-statistic). Conventional F-statistic used as distribution is nonstandard and asymptotic. Therefore, Pesaran et al (2001) gave two critical values for test of co-integration, lower critical bound considers that all variables are I (0) implying that there exist no co-integration exists among variables. The F test is used to test the co-integration amongst the series where the null hypothesis is that βetas are jointly equal to zero (i.e. $\beta_{1=}$ $\beta_{2=}$ $\beta_{3=}$ $\beta_{4=}$ β_{n}------- =0). If computed F-Value is lesser than the F critical value for upper bound then null cannot be rejected. If the computed F-value exceeds the critical F-value for upper bound, then the null of no co-integration is rejected; If the computed F-value falls between the lower and upper bound, then the test stand inconclusive, showing that relationship among variables cannot be ascertained.
7. **Estimating Long-Run Model:** If long run relationship is there or variables are co-integrating then we proceed to estimate long run model along with ECM (Error Correction Mechanism).
8. **Estimating the Short Run Model:** The short run dynamics of the series can be explained by employing ECM. ECM $_{t-1}$ signifies the speed of adjustment of a parameter, implying now quickly series converges to long run equilibrium. The co-efficient must be significant and

negative in sign. As per Banerjee et al (1993) and Kinanemarim (2014), highly significant ECM co-efficient confirms the pressure of stable long run relationship.

1.4.3 Financial Inclusion Determinants for Individuals – Demand Side

1.4.3 (A) Dimension of Barrier – Demand Side

A.1 Determinants of Voluntary Financial Exclusion – The Unbanked

1. Barrier of "Lack of Money"

The lack of income is the second highest cited barrier for financial inclusion. Globally it prevents nearly 25 percent of the unbanked from availing formal financial services. There is evidence in literature for accounting the employed variables of *Per capita income* and *Unemployment* as a measure of barrier of lack of money.

For Pakistan, lower income is the foremost determinant influencing the level of account holding. Banking services fee is other reason negatively influencing lesser-income group in availing banking services and opening bank accounts.

2. Barrier of "Lack of Access to Financial Services"

Super Inclusion-Up Market

Speak and Graham (2000) found out that individuals start turning away from financial services where services are physically difficult to access. It further undermines the individual autonomy as they then need to bank upon "someone else" to perform their banking [Kempson and Jones 2000]. Toporowski (1986) stated that the "august air of mystery" that surrounds banking and financial services for ones outside the financial – structure, constitutes a distinctiveness for such individuals to use banking services since banks are viewed (often correctly) as serving the advantaged and up market classes who in turn progress from the stage of financial inclusion to super inclusion.

We construct the variable of super-inclusion by considering a total of "All amount" & also "# of accounts" of *Total loans* disbursed by banking sector *above the threshold of Rs. 1 million* as per theory, bigger loans that are tailored for up market cause super inclusion of rich & advantaged segments of society.

The logical reasoning supporting the maximum threshold of Rs. 1 million is that in Pakistan, the income tax exemption threshold is of PKR 400,000/annum (salaried or non-salaried individual) i.e. a monthly income of Rs. 33,333/month. Further, as per "Prudential Regulations" of SBP, the maximum time period for a consumer loan is 5 years with a maximum Debt Burden Ratio (DBR) of 50 percent for individuals. Thus, an individual, earning the maximum income, exempted by tax (Rs.400, 000) can repay the maximum installment of Rs.16,666/month (DBR 50 percent) for a maximum period of 60 months (5 years). Thus, the low-income individual is eligible for a maximum loan amount of Rs. 1 million as per eligibility & repayment capacity. Thus, the threshold selected for financial Inclusion advances for individuals representing disadvantaged/vulnerable segments of society ranges from < 5k to 1 million (maximum).

3. Barrier of In-appropriate Product

The in-appropriate products of banking sector lead to non-account holding as banking products are in-appropriate for certain group of potential customers. It's not that such group opted to close their accounts, rather they are not in a position to utilize appropriate products. Therefore, customized products are especially made for high-valued clientele (super inclusive market), whereas low end of market gets little focus. Inappropriate products tend to exclude lower-income depositors/borrowers from applying for composite products, leading to self-exclusion.

"The mismatch between prospective customers needs and the products offered, while product variety is very clearly part of answers, for all under covered markets" (Timothy Edmonds, 2009).

For this study, we construct the variable of in-appropriate product by considering a total of *"All amount"* against all *rate of margin* & against *7 types of high powered collaterals securities* as collateralized loans are a barrier to demand side of financial Inclusion & in-appropriate product for low income groups; tailored for up market.

A.2 Determinants of In-Voluntary Financial Exclusion – The Unbanked

1. Barrier of Distance (Geographical Exclusion)

The barrier of distance as per global Findex data set is one of the highly cited reason by unbanked population that hinders them from having an account. As highlighted by Demirguc; it is more observed in developing economies with remote access points. As per literature there is an agreement that "Spatial dimension "of financial exclusion creates massive hindrance for residents of rural and urban deprived areas.

In Pakistan the access to basic financial and banking services is imbalanced. Both internal and external reasons impact the rate of penetration of bank accounts in Pakistan's case. Internal reason includes lower wages of rural workers, weakening their capacity of consumption and reduced demand for utilizing a system of payment. Thus, rural residents facing major financial exclusion. Rather rural- urban segmentation is a major feature of Pakistani banking system. Difference exists between urban/rural groups as only 14 percent of rural residence hold deposit and loan with formal banks (A2F 2015, SBP) whereas urban residence shows 21 percent, showing that nearly 55 percent of rural residents are totally excluded from any kind of financial services. More over migrant workers of rural areas also experience hurdles in accessing banking services. In fact, as per A2F 2015, Pakistanis who experience most difficulty with baseline banking services (account opening) are households in rural and remote areas along with low wage migrant workers with no resident

status in workplace. Thus "rural residence" is used as a measure of geo-graphical exclusion in this study.

2. Barrier of Non-Account Holding

Globally, lack of income is the most stated reason for not having a bank account. Gender, age, education also have a strong impact on account ownership. We also employ these three variables; *female population; age groups of children & old population; financial illiteracy* as a measure of non-account holding for Pakistan. Lesser possibilities are for vulnerable groups (female, less educated/primary school, rural residents) in developing countries to use and own personal accounts. These factors also hold in case of Pakistan e.g. female-male ratio of account ownership is significantly different. Massive difference exists between genders (A2F 2015, SBP) notably, there are fewer females with accessibility to banking services in Pakistan (5.5 percent vs. 21.1 percent men), money transfers (1.4 percent vs. 3.3 percent men) and insurance (0.6 percent vs. 3.3 percent men).

3. Barrier of Lack of Trust

Lack of trust in the formal financial system is cited by 13 percent of the adult population as per Global Findex data. As Kempson states "A lack of appropriate financial product and restrained access have created mistrust of banks and created a conviction that they are not interested in fulfilling the needs of individuals at low income" (Kempson et al 2000). In this study we use the *Financial freedom index, Range (0-100),* that measures the effectiveness of banking system and the involvements of government into the financial system & *Regulatory quality index, Range (-2.5 weak; 2.5 strong),* that captures perceptions of the government's ability to devise and implement comprehensive regulations and policies that encourage private sector development; for depicting

the barrier of lack of trust for Pakistan. Other studies also show evidence of usage of these World Bank indicators.

1.4.3 (B) Dimension of Usage (The Banked) – Demand Side

The usage dimension of demand side is conditioned by a number of socio-economic and macro factors as per literature. The demographic indicators of *saving* and loan also show percent of adult population that is saving and has a loan in formal banking system (Camara & Tuesta 2015). Global Findex identifies the users of new technological channels of *E-banking*, the "individuals using mobile banking services but do not own an account" as financially included. Based on literature this study also uses the variables of *Total Bank Branches, Saving & Electronic banking* for modeling Usage dimension of demand side of financial Inclusion for Pakistan.

1.4.4 Banking Determinants – Demand Side

1. **Deposits of Financially Inclusive Accounts (Total)**

As per literature no-frill accounts (low fee & low-cost deposits & advances) & short-term accounts are financially inclusive in nature. Therefore, as banking determinant-demand side, we consider the deposits of Current account, Saving accounts & Fixed accounts (short term ranging from < 3 months to < 2 year) in total to represent financially inclusive *no frill accounts* in Pakistan's banking sector; both with reference to "Amount & Accounts".

2. **Deposits of Microfinance Institutions**

Deposits of Micro-finance Institution are also considered in the similar, financially inclusive categories of Current, Saving & Fixed accounts (short term ranging from < 3 months to < 2 year) in total as Microfinance Institutions, in the capacity of informal sector, in turn facilitates financial Inclusion at individual level.

3. **Deposits (Personal)**

This variable reflects the deposits of Individuals as per Statistics of Scheduled Banks in Pakistan & are purely financially inclusive deposits & accounts observed for the selected categories of Current, Saving & Fixed accounts (short term ranging from < 3 months to < 2 year).

4. **Deposit by Rate of Interest & Rate of Return**

In construction of these two variables, *low interest & low cost accounts* are identified as per definition of financially inclusive accounts in 3 categories (Current, Saving & Fixed < 2yr) against the full *interest rate range & rate of return range of 0 – 8.75 & above*. *First half* of total range is selected for financial Inclusion accounts comprising of *interest rate range & rate of return range of 0 - 4.50percent* in which majority of accounts are present.

5. **Deposit by Size of Account (Personal)**

Again, in this variable, *low balance accounts* are identified as per definition of financially inclusive accounts, under the category of *Personal deposits* against the full range of size of accounts from <5k – 10 mill & above. The threshold selected for financial Inclusion accounts is size of accounts from <5k – 1million as per logical reasoning given earlier in measuring super inclusion of up market.

1.5 DATA

1.5.1 Data Source & Type

The time series data for Financial Inclusion determinants, micro determinants of banking sector, comprising of 4 categories of Banks (All banks; Public, Foreign & Scheduled commercial) and macro determinants based on annual data of Statistics on Scheduled Banks in Pakistan (SBP), State Bank of Pakistan; Statistical Hand Book (Pak Economy) & Statistical Publications.

For Financial Inclusion determinants (demand and supply side) and macro determinants, time series data from Dec 1973 – Dec 2017 is used. Whereas for micro determinants of banking sector, data comprising of 4 bank types is employed for a period ranging from Dec 1973 – Dec 2017. For some variables, data is primarily extracted from WDI (World Bank); The Global Economy (UNESCO); Financial Structure Data set and Global Financial Development data base; for certain variables like age groups, regulatory quality index, the data sources of UNDP and Heritage Foundation are used.

FINANCIAL INCLUSION -DEMAND SIDE		
DIMENSION OF USAGE –DEMAND SIDE		
THE BANKED		
VARIABLES	**CONSTRUCTION**	**SOURCE**
GEO-GRAPHIC OUT REACH # OF BANKS (TOTAL) # OF BRANCHES (TOTAL)	Out Reach by Area **BNK_{TOT}** (#) **BBR_{TOT}**	Appendix-I a) Scheduled Banks' Offices by Nationality, C. Appendices, Banking Statistics of Pakistan, Annual, Statistical Publication, All Banks (1973-2017)
SAVING (TOTAL) -PUBLIC SAVING -PRIVATE SAVING	**S** (Million Rs) **S_{PUBLIC}** **$S_{PRIVATE}$**	"Gross domestic savings (percent of GDP)" converted to millions (1973-1972) WDI 1.7 Investment and Savings at Current Prices 5. National Savings (1973-2017) (a) Public Savings (b) Private Savings FY value Handbook of Statistics on Pakistan Economy
ELECTRONIC BANKING AMOUNT OF E-TRANSACTIONS	**E-BANK TR_{AMOUNT}** (Million Rs) Comprising of 6 types of transactions (internet, ATM, POS, RTOB, mobile, call center)	14. Telegraphic Transfers Issued and Encashed by the State Bank of Pakistan, Part-1, Banking Statistics of Pakistan, Annual, (1973-2004) (Issued value) 4.26 Electronic Banking Statistics, 4. Money & Banking, E-Banking Financial Transactions Handbook of Statistics on Pakistan Economy (2004-2017) Dec value (2^{nd} quarter value of FY=Dec value taken)
DIMENSION OF BARRIER –DEMAND SIDE		
DETERMINANTS OF VOLUNTARY FINANCIAL EXCLUSION-THE UN BANKED		
1. BARRIER OF "LACK OF MONEY"		
PER CAPITA INCOME **UN-EMPLOYMENT**	**Measures for voluntary exclusion barrier of "lack of money"** **$Y_{PER\ CAPITA}$** Unemployed (in Millions) **UN EMP** Population in mill/100 x lab force percent = lab force in millions lab force in millions/100 x unemployed percent= unemployed in mill	1.1 Gross National Product 8. Per Capita Income (FC) in Rs (1973-2017) Handbook of Statistics on Pakistan Economy 1973 onwards till 2017 FY value 10.1 Population of Pakistan & 10.3 Distribution of Population by Economic Category (1973-2017) Handbook of Statistics on Pakistan Economy

2. BARRIER OF "LACK OF ACCESS TO FIN. SERVICES"		
SUPER INCLUSION UP MARKET **A. SUPER INCLUSION UP MARKET (Total Dep)** AMOUNT BY ALL BANKS NO. OF ACCOUNTS BY ALL BANKS	**$S_{INC\ UP\ MKT_{AMOUNT}}$** (Million Rs) **$S_{INC\ UP\ MKT_{\#\ OF\ ACCOUNTS}}$** **A measure for voluntary exclusion barrier of "lack of access to financial services"** A total of All amount & # of accounts of **Total Deposits** above the threshold of Rs. 1 million as bigger deposits belong to up market causing super inclusion of rich & advantaged segments of society	4.3 Distribution of Scheduled Banks' Deposits by Size of Account Statistics on Scheduled Banks in Pak (SBP) 1973 onwards for all banks (Dec value)
3. BARRIER OF "IN-APPROPRIATE PRODUCTS"		
SUPER INCLUSION UP MARKET COLLATORAL (Total Advances) AMOUNT BY ALL BANKS	**$S_{INC\ UP\ MKT\ COLL_{AMOUNT}}$** (Million Rs) **A measure for voluntary exclusion barrier of "In-appropriate Product"** A total of All amount against 7 types of high-powered collaterals securities as collateralized loans are a barrier to demand side of financial Inclusion & in-appropriate product for low income groups, tailored for up market causing super inclusion of advantaged segments of society **Range: 7 types of Collateral**	4.16 Classification of Scheduled Banks' Advances by Securities Pledged (All Banks) 7 types & amount (Dec value) Handbook of Statistics on Pakistan Economy 1973-2017
DETERMINANTS OF IN-VOLUNTARY FINANCIAL EXCLUSION-THE UN BANKED		
1. BARRIER OF "DISTANCE" (GEO-GRAPHICAL EXCLUSION)		
RURAL RESIDENCE (Exclusion by distance)	Rural population (in Millions) **$RURAL_{POP}$** Total Population in mill/100 x Rural population (percent of total population) = Rural population in millions	Rural population (percent of total population) converted to millions (1973-1990) WDI 10.1 Population of Pakistan (1991- 2017) 1991 -2017 Handbook of Statistics on Pakistan Economy
2. BARRIER OF "NON-ACCOUNT HOLDING" (Due to Age, Gender & Education)		
NON-ACCOUNT HOLDING BY GENDER	Female population (in Millions) **FE_{POP}** Total Population in mill/100 x Female population (percent of total population) = Female population in millions	Population, Female (percent of total population) converted to millions (1973-1990) WDI 10.1 Population of Pakistan (1991- 2017) Handbook of Statistics on Pakistan Economy

NON-ACCOUNT HOLDING BY AGE	Children & Old Population Groups **AGE $GP_{C\&O}$** Total Population of: Age group of 0-18 & Age group 65 & above Total Population in mill/100 x C&O population (percent of total population) = Age $GP_{C\&O}$ in millions	Population, All ages above 65 M&F (percent of total population) & Population, All ages of children 0-18 M&F (percent of total population) converted to millions (1973-1990) WDI
NON-ACCOUNT HOLDING BY EDUCATION	Illiteracy Rate (percent) **FIN ILL (Financial Illiteracy)**	enrollment rates, primary, secondary & tertiary from 1973-2016 WDI
3. BARRIER OF "LACK OF TRUST"		
FINANCIAL FREEDOM INDEX	Measures the efficiency of the banking system and the interventions of the government into the financial system **FFI** Range (0-100)	Heritage Foundation (1995- 2017) global economy
REGULATORY QUALITY INDEX	Captures perceptions of the ability of the government to formulate and implement sound policies and regulations that promote private sector development. **RQI** Range: (-2.5 weak; 2.5 strong)	WDI, World Bank help needed (1973- 2017) global economy
BANKING VARIABLES – DEMAND SIDE		
DEPOSITS OF FIN.INC By Type of ACCOUNTS TOT (A+B+C) (Amount & # of Accounts) **A. DEPOSITS CURRENT ACCOUNT** (Amount & # of Accounts) **B. DEPOSITS SAVING ACCOUNTS** (Amount & # of Accounts) **C. DEPOSITS FIXED ACCOUNTS**: (Amount & # of Accounts) **Comprising of:** • **< 3 months** • **3 months & over but < 6 months** **6 months & over but < 1 year** • **1 year & over but < 2 year**	As per literature these deposits are no-frill deposits & are financially inclusive in nature **DEP F_{INC} TOT_{AMOUNT}** **DEP F_{INC} $TOT_{\#\ OF\ ACCOUNTS}$** **DEP CA_{AMOUNT}** **DEP $CA_{\#\ OF\ ACCOUNTS}$** (Million Rs) **DEP SAV_{AMOUNT}** **DEP $SAV_{\#\ OF\ ACCOUNTS}$** Deposits Fixed (ST) comprise of deposits fixed for short term as per theory of financial inclusion **DEP FIX(ST)$_{AMOUNT}$** **DEP FIX(ST)$_{\#\ OF\ ACCOUNTS}$** By excluding accounts over 2 years-3 years to 5 years	4.18 Distribution of Scheduled Banks' Deposits by Type of Account Hand book from 1973 All banks only & amount & # of account. (Dec value)

DEPOSITS OF MICRO FIN INSTITUTIONS (Amount)	Deposits of Micro-finance which in turn facilitate financial Inclusion **DEP MFI$_{AMOUNT}$** (Million Rs)	4.17 Scheduled Banks' Deposits Distributed by Category of Deposit Holders in handbook from 1973 All banks only & amount only B-II-6-d (Cooperative proxy)1973-1981 B-II-6-v (NBFI proxy) 1982-2000 B-III-(ii) (Development Fin. Institution proxy) 2001-2002 B-III-(D) (Microfinance) 2003-2015 All Dec values Statistics on Scheduled Banks in Pak (SBP)
DEPOSITS PERSONAL (Total Amount)	Deposits of Individuals **DEP PERSONAL$_{AMOUNT}$** (Million Rs)	4.17 Scheduled Banks' Deposits Distributed by Category of Deposit Holders in handbook from 1960 All banks only & amount only (Personal)1973-2017 Dec value Statistics on Scheduled Banks in Pak (SBP)
DEPOSIT BY RATE OF INTEREST (Amount)	**DEP ROI$_{AMOUNT}$** (Million Rs)	4.19 Weighted Average Rates of Return on Deposits in handbook from 1973-2017 Dec value 4.Overall - (ii) Including current & other deposit rate Handbook of Statistics on Pakistan Economy
DEPOSIT F$_{INC}$ BY SIZE OF ACCOUNT (Amount & # of Accounts)	Low cost accounts identified under Personal deposits against the full range of size of accounts from <5k – 10 mill & above. The threshold selected for financial Inclusion accounts is size of accounts from <5k – 1million. (Million Rs) **DEP PER SOA$_{AMOUNT}$** **DEP PER SOA$_{\# OF ACCOUNTS}$**	4.3 Distribution of Scheduled Banks' Deposits by Size of Account 1973 0nwards for all banks (Dec value) Statistics on Scheduled Banks in Pak (SBP)

1.6 EMPERICAL RESULTS

ARDL Co-integration Test – Usage Dimension

The test of Unit Root[2] indicates integration of order (1) or order (0) in all series, with no exception of any series integrated of order (2). This allows for testing the long run relationship between Financial Inclusion and *Usage dimension* of demand side by employing Bounds testing. Eq (1) is calculated using OLS and long run relation of Eq (1) is established by calculating joint F-Statistics.

$$\Delta FINC\ OutPut_t = \varphi_0 + \varphi_1 \sum_{i=1}^{p} \Delta (BBR)_{t-i} + \varphi_2 \sum_{i=1}^{p} \Delta(S)_{t-i} + \varphi_3 \sum_{i=1}^{p} \Delta (E\text{-}BANK\ TR)_{t-i} + \theta_1 (BBR)_{t-1} + \theta_2 (S)_{t-1} + \theta_3 (E\text{-}BANK\ TR)_{t-1} + \mathcal{E}_t \qquad eq\ (1)$$

The calculated F-Statistics along with critical values proposed by Pesaran et al (2001) at significant levels are as per Table-3.

Table 2: Test Statistics and Choice Criteria for Selecting the order of the VAR Model

Order	LL	AIC	SBC	LR test	Adjusted LR test
3	188.1532	150.1292	134.2877		
2	179.3714	163.1364	152.1425	CHSQ(4) =1.8994 (0.612)	2.1020(.6124)
1	155.2199	143.2211	136.1546	CHSQ(8)= 39.2113(0.000)***	34.3487(.000)***
0	120.1287	114.1837	112.4465	CHSQ(12)=98.3161(.000)***	90.1475(.000)***

*Note: *** Significant at 1 percent level*

LL=Log likelihood, AIC= Akaike Information Criterion, SBC=Schwarz Bayesian Criterion, LR= Log likelihood Ratio

Table No 3: Bounds Tests for the Existence of a Long Relationship

	F-statistic	1 percent Critical bounds	
		I(0)	I(1)
Lag 4	2.816	3.93	5.23
Lag 3	6.1122	3.93	5.23
Lag 2	7.1612	3.93	5.23
Lag 1	8.3254	3.93	5.23

[2] See appendix for the ADF Unit root test tables of Demand & Supply side

At the optimum lag length of order (1), the F statistic exceeds the critical value at 1 percent significant level. Thus, a strong long run relation is among the variables.

ARDL Long-Run Estimates – Usage Dimension

Next, we proceed to ARDL co-integration for long run estimates of the usage dimension of the demand side's Financial Inclusion. However, we proceed the long run estimates with *three specifications of the usage dimension* for a comprehensive analysis.

First model is the general model of usage dimension comprising of Bank branches, total savings and electronic banking transactions. While in the rest of the two models we introduce *Regulatory Quality Index* in the models and observe the behavior of saving, E-banking transactions and their impact on Financial Inclusion in the context of regulatory frame work and government interventions for financial sector development. The long run estimates are given in Table-4.

Table No.4: Long Run Estimate of Dimension of Usage			
Dependent Variable is financial Inclusion			
	Model 1	**Model 2**	**Model 3**
BBR	0.2833***	0.1853***	0.1975*
	(0.1071)	(0.0649)	(0.1083)
Saving	0.7602***	0.6951***	0.6090***
	(0.1803)	(0.1837)	(0.1253)
E-Bank Tr	0.3382***	0.6837***	0.4858***
	(0.1155)	(0.1851)	(0.1594)
Saving*RQI	--	0.5716***	--
	--	(0.1842)	--
E-Bank Tr*RQI	--	--	0.5871***
	--	--	(0.1543)
Constant	0.9361***	0.5277***	0.4022**
	(0.2047)	(0.1769)	(0.1695)
Diagnostic			
Normality	0.1877	0.4528	0.2264
Serial Correlation	0.1650	0.4767	0.8442
Heteroscedasticity	0.5879	0.2807	0.7422
Functional Form	0.6166	0.1613	0.2885

For the first general model specifications, the co-efficient of Bank branches (BBR) is highly significant at 1 percent rise in BBR leads to 0.28 percent use in Financial Inclusion. The results are in line with the empirical studies which show that presence of strong branch network and banking amenities are main enablers of capital expansion and formation (Feldstein and Horioka, 1980; Ford and Poret, 1991). A number of financial inclusion studies used branch network to capture density (Burges and Pande, 2003: Leeladhar, 2006; Subha Rao, 2007). Kumar (2013) summed up his analytical findings of Financial Inclusion in India and found that branch density strongly and positively impacts the Financial Inclusion drive.

We also model other important predictors of saving (S) and E-Banking Transactions (E-Bank Tr) which turn out to be highly significant. The co-efficient of saving depicts that a 1 percent increase in saving, keeping all else same, will lead to 0.76 percent increase in the gross deposit portfolio of Banking Sector, a measure of Financial Inclusion from demand side. We can relate the results to the studies of Demirguc – Kunt and Klapper (2013), showing Asian countries increased level of formal savings. Yang (2012) observed the same for Asian Countries. Studies confirm that public and private saving primarily compose the deposit portfolios of the commercial banking sectors in Asian Countries empirically contributing to Financial Inclusion (Horioko and Terada – Hagiwara, 2011).

Similarly, the highly significant and positive co-efficient of E-Bank Tr, 0.338, implies that 1 percent increase in electronic transactions contribute to the Financial Inclusion of almost 0.33 percent thus confirming the usage-led Financial Inclusion hypothesis where higher digital financial usage leads to greater Financial Inclusion. The advancement of information, communication, internet and mobile technologies play a critical role in Financial Inclusion on economic progress (Andrianaivo and Kpodar, 2011). Triki and Faye (2013) studied how technology, especially mobile

and online transactions impact Financial Inclusion and found that adoption of electronic and mobile technology has ensured accessing cheap and reliable financial services to large number of Unbanked in developing Africa. Arun and Kamath (2015) observed that technology plays a formidable part in financial inclusion.

In the second specification of the Usage dimension the Regulatory Quality Index, a measure of capacity of government to define and execute social policies and rules that enhance private sector progress, interacts with the saving variable and the change in the direction of magnitude of saving is observed in the following manners.

$$D = \beta_{0+} \beta_1 BBR + \beta_2 \text{ Saving} + \beta_3 \text{ E-Bank Tr} + \beta_4 \text{ Saving}^{*} \text{RQI} + Ɛt$$

$$\frac{\partial D}{\partial S} = \beta_2 + \beta_4 * \text{RQI}$$

The result show that like earlier, the co-efficient of BBR, S and E-Bank Tr are highly significant in this model with a positive sign. The co-efficient of Saving *RQI turns out to be highly significant depicting that regulatory environment is conducive for saving and saving led Financial Inclusion where a 1 percent increase of RQI not only results in 0.57 percent increase in the measure of Fin. Inclusion of demand side but also has a positive reinforcing effect on the existing saving levels.

Saving is essential for long run eco-growth as it translates itself in investment and saving accounts at financial institutions. Asuming et al (2019) showed that per capita GDP, ATM/100,000 persons and regulatory quality indicators are the main macro-prediction of owning of accounts. High account ownership reflects higher saving level, thus there exists a positive association of saving under conducive regulatory environment and level of Financial Inclusion.

For third model of usage dimension, the impact of RQI on E-Bank Tr captured in a similar manner.

$$D = \beta_{0+} \beta_1 BBR + \beta_2 \text{ Saving} + \beta_3 \text{ E-Bank Tr} + \beta_4 \text{ E-Bank Tr} * \text{RQI} + Ɛt$$

$$\frac{\partial D}{\partial E\text{-}Bank\ Tr} = \beta_2 + \beta_4 * \text{RQI}$$

Again, the variables of BBR, Saving and E-Bank Tr turn out to be statically significant and bear positive relation with the dependent variable. The co-efficient of E-Bank Tr *RQI highly significant with value of 0.58 corroborates contemporary findings that a sound regulatory framework and government patronage supports Digi-tech eco-system and ICT transactions, enhancing Financial Inclusion in ultimate analysis. Kumar (2013) found out for India that RBT relation of ATM Kiosks opening and branch opening for rural masses facilitation technology for business correspondent model bore desired results for Financial Inclusion.

ARDL Short-Run Estimates – Usage Dimension

Here we present the result of short run and the co-efficient of ECM. The short run coefficients are similar in signs as of long run estimates and are in line with priori expectations.

Table No.5: Short Run ARDL Estimate Usage Side			
Dependent variable is the financial Inclusion			
	Model 1	**Model 2**	**Model 3**
ΔBBR	0.6038***	0.3644*	0.3221**
	(0.2011)	(0.1990)	(0.1573)
Δsaving	0.6248***	0.8818***	0.8836**
	(0.2024)	(0.2184)	(0.4714)
ΔEbnak	0.7571**	0.5687	0.4501**
	(0.3850)	(0.5114)	(0.1987)
Δsaving*RQI	--	0.3161***	--
	--	(0.1011)	--
Δ Ebank *RQI	--	--	0.3877***
	--	--	(0.1552)
$ecm_{(-1)}$	-0.1915*	-0.1325*	-0.1477**
	(0.1037)	(0.0729)	(0.0663)
Diagnostic Test Statistics			
R-Squared	0.5731	0.7597	0.7346
F	6.0118	6.6173	6.3711
DW	1.8158	1.7425	1.8525
CUMSUM	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable

The short run dynamics are very important due to the co-efficient of ECM. The *ECM* t_{-1} lagged error correction co-efficient is given in the last row of table 5, where it is significant with appropriate sign. Therefore, confirming the co-integrating relation among the variables. The *ECM* t_{-1} co-efficient depicts the pace of adjusting the long run equilibrium after a short-term shock. *ECM* t_{-1} co-efficient – 0.1915 indicates that approximate 19percent of the last year shocks disequilibria adjusts back to long run equilibrium in present year.

Diagnostic Test

Our model qualifies the diagnostic test. The results are present in the lower panel of table 4. The P-values show the non-existence of serial correlation: The P-values are 0.6166, 0.1613, and 0.2885. The P-values of functional form for all the three models show well specified model and P value of normality 0.1877, 0.4528, 0.2264 indicates the acceptance of null hypothesis of normality assumption of residuals.

Barrier Dimension

Unit-Root Testing:

Results of ADF Unit-Root are as per Table 1. Certain variables display properties of stationarity, while others do not depict any form of non-stationarity, thus we cannot reject the null hypothesis of non-stationarity at their level form. On applying ADF test to first difference of these variables, we obtain stationarity for all. The variable in the barrier dimension model are integrated both of order 0 or 1, thus appropriate for ARDL technique.

Test of Lag Choice Criteria:

As stated earlier, the optimal lag length turns out to be one for all models. We reserve this lag structure for rest of the models and estimations. Table 06 presents results of choice criteria for selecting the order of VAR model.

Table No.6: Test Statistics and Choice Criteria for Selecting the order of the VAR Model					
Order	**LL**	**AIC**	**SBC**	**LR test**	**Adjusted LR test**
3	190.2627	151.8124	135.7933	0	0
2	181.3824	164.9654	153.8482	CHSQ(4) =1.9114 (0.512)	5.4010(.5124)
1	156.9601	144.8268	137.6811	CHSQ(8)= 37.1021(0.000)***	36.3114(.000)***
0	121.4755	115.4639	113.7072	CHSQ(12)=84.1247(.000)***	88.1141(.000)***
Note: *** Significant at 1 percent level					
LL=Log likelihood, AIC= Akaike Information Criterion, SBC=Schwarz Bayesian Criterion, LR= Log likelihood Ratio					

ARDL Co-integration Test-Voluntary Financial Exclusion Model:

We estimate the following equation:

$$\Delta FINC\,OUTPUT_t = \beta_0 + \beta_1 \sum_{i=1}^{p} \Delta (\text{Y}_{\text{PER CAPITA}})_{t-i} + \beta_2 \sum_{i=1}^{p} \Delta (\text{UN EMP})_{t-i} + \beta_3 \sum_{i=1}^{p} \Delta (\text{S}_{\text{INC}}\text{ UP MKT})_{t-i} + \beta_4 \sum_{i=1}^{p} \Delta (\text{S}_{\text{INC}}\text{ UP MKT COLL})_{t-i} + \alpha_1 (\text{Y}_{\text{PER CAPITA}})_{t-1} + \alpha_2 (\text{UN EMP})_{t-1} + \alpha_3 (\text{S}_{\text{INC}}\text{ UP MKT})_{t-1} + \alpha_4 (\text{S}_{\text{INC}}\text{ UP MKT COLL})_{t-1} + \pi_t \qquad eq(2)$$

We apply the ARDL co-integration technique for testing the long run relationship between Financial Inclusion and the voluntary "Financial Exclusion" determinants of the dimension of Barrier. Table 07 presents the results of bounds test. The lower bound-upper bound critical values are obtained. The estimated Wald F-Statistic is 10.742 which is larger than the lower bound critical value of 3.9300 and upper bound critical value of 5.2300 at 1percent level of significance.

Table No. 7: Bounds Tests for the Existence of a Long Relationship								
Order	**F-Statistic**		**1 percent Critical bounds**		**5 percent Critical Bounds**		**10 percent Critical Bound**	
Lag 4	4.0380		3.9300	5.2300	3.1200	4.2500	2.7500	3.7900
Lag 3	5.6545		3.9300	5.2300	3.1200	4.2500	2.7500	3.7900
Lag 2	6.2623		3.9300	5.2300	3.1200	4.2500	2.7500	3.7900
Lag 1	10.7421		3.9300	5.2300	3.1200	4.2500	2.7500	3.7900

Thus co-integration exists between the variables in the voluntary "Financial Exclusion" model and we reject the null hypothesis of no long-run relationship. Since the long-run relationship is evident

through bounds test approach, we proceed to estimate the long-run equation and co-efficient of the specified model.

ARDL Long-Run Estimates: Voluntary Financial Exclusion Model:

For the *Voluntary Financial Exclusion* Model, we estimate the long-run coefficients with three specifications for a holistic analysis.

First model contains of determinants barrier of lack of money, barrier of lack of access to financial services and barrier of in-appropriate products, all comprising the "Voluntary Financial Exclusion" side of Barrier dimension. Whereas in the other two models, we again introduce and analyze the impact of regulatory quality index on the barrier of lack of access to financial services and barrier of inappropriate products. The long-run result of ARDL model are as per table-08. All variables are statistically significant.

For the first generic specification, the co-efficient of per capita income is highly significant, pointing that 1 percent increase in income results in an increase of about 0.247 percent in the gross

Table No. 8: Long Run Estimate of Dimension of Barriers			
Dependent Variable is financial Inclusion			
	Model 1	**Model 2**	**Model 3**
Per Capita	0.2478***	0.9476***	0.0932***
	(0.1003)	(0.1845)	(0.0131)
Unemployment	-0.0948*	-0.0248***	-0.0714***
	(0.0523)	(0.0066)	(0.0281)
SINC Amount	-0.8079***	-0.2032*	-0.7203***
	(0.2196)	(0.1071)	(0.1341)
SINC Collateral	-0.8840***	-0.2559**	-0.8753*
	(0.1453)	(0.1098)	(0.4952)
SINCA*RQI	--	0.1104**	--
	--	(0.0465)	--
SINCC*RQI	--	--	0.1427***
	--	--	(0.0481)
Constant	0.3235***	0.6569***	0.3947**
	(0.0785)	(0.0843)	(0.1694)

Diagnostic Test			
Normality	0.1804	0.4189	0.7901
Serial Correlation	0.5915	0.4246	0.5264
Heteroscedasticity	0.9382	0.5163	0.0795
Functional Form	0.8617	0.8867	0.9268

Deposit portfolios, a measure of Financial Inclusion from the demand side. Researchers reported similar results in their study. Studies have shown that per capita has strong correlations with financial inclusion (Honohan 2008). House held survey data proved that individuals with higher income levels are more likely to be financially included (Al-Hussainy et al, 2008), Wang and Guan (2017) found out that income is significantly linked with financial inclusion, in fact income co-efficient turn out to be very large and with increased income, the possibility of being acceptable by banks and financial institution's increases.

Along with per capita income, unemployment is another determinant of the sub-barrier of lack of money. The long run estimate show that employment is statistically significant at 10 percent level of significance and shows a negative relationship with Financial Inclusion measure. Theoretical and empirical literature also endorses the same relationship as Wang and Guan, 2017 showed that in developing countries, Financial Inclusion rises in response to both declining unemployment, inequality ratios and prosperity measures. Unemployment growth rate generates a continuously expanding divide among the poor and the rich, which translates itself in the form of challenges for implementation of Financial Inclusion causing difficulties for commercial banks to alleviate their non-performing loans. Devlin (2005) argued that advanced and industrialized economies exhibit a greater role of banking and financial sector. It happens because employment proportion present employment status in these countries. The ones having secured status are less likely to be financially excluded.

A significant contribution of this study is its seminal investigation and modelling of "Super Inclusion"; portfolios tailored for the up-market, generating a barrier of lack of access to financial services and barrier of in-appropriate product for the disadvantaged segments of society. As per expectations, the long run co-efficient of both the determinants $SINC_{Amount}$ and $SINC_{Coll}$ exhibit a negative relation with Financial Inclusion measures.

The results are consistent with Espinoza and Prasad (2010) showed that increased sizes of loans have a negative impact on NPL's, and it is harder for bank managers to tackle with the repercussions of timely credit risk. Scrutiny of bank's views, indicate that increase in NPL problem could be affected by size of loans & bank management (Guan et al. (2017).

In the second specification of the Barrier Model, we model "Super Inclusion" under the effect of RQI along with all other variables whereas in the third model RQI interacts with "Super Inclusion-Collateral Variables", with other variables. The result show that like the earlier model, co-efficient of per capita income, unemployment, The co-efficient of $SINC_{Amount}$ and $SINC_{Coll}$ are significant and essentially bear the same negative relationship with Financial Inclusion except for the per capita income. The co-efficient of $SINC_{Amount}$*RQI and $SINC_{Coll}$*RQI attains 5 percent level of significance with positive sign, suggesting that apart from demand (individuals) and supply (Financial Institutions) factors, Financial Inclusion is dependent on social environment. If a country is economically developed, its financial sector will also be developed. Countries which have higher free social environment tend to have higher Financial Inclusion. Conducive regulatory environment and economic freedom factors Financial Inclusion and diminishes the negative impacts and concentration

ARDL Short-Run Estimates: Voluntary Financial Exclusion Model:

Table 09 summarizes the short run parameters of "Voluntary Financial Exclusion" model. Elasticities of demand model are majorly significant at 1 percent and 5 percent level of significance

for the 3 models. It implies that series is in explosive and equilibrium is attainable in long run. The coefficients reveal that 10.8percent, 13.6percent and 14.7percent dis-equilibrium in Financial Inclusion, current period's function would be corrected in next year respectively for each model specification.

Diagnostics: The validity of results hinges upon goodness of fit and of model stability, thus table-8 summarizes result of diagnostic check. The reported residual diagnostic of the "Voluntary Exclusion Model" show normally distributed residuals. The stats also reveal no autocorrelation in model. The model looks non-heteroscedastic due to passing hetero test. The Ramsay RESET test shows that model is well specified by P-value of 0.8 and 0.9.

Table No. 9: Dependent variable is the financial Inclusion			
	Model 1	**Model 2**	**Model 3**
ΔPer Capita	0.1306***	0.4217***	0.4923***
	(0.0377)	(0.1352)	(0.1776)
ΔUnemployment	-0.4241**	-0.5106*	-0.2352**
	(0.2066)	(0.2805)	(0.1051)
ΔSINC Amount	-0.2364**	-0.9320***	-0.1071***
	(0.1129)	(0.1365)	(0.0341)
ΔSINC Collateral	-0.3663*	-0.4252**	-0.6125*
	(0.1968)	(0.1823)	(0.3359)
ΔSINCA*RQI		0.5188***	
		(0.1917)	
ΔSINCC*RQI			0.8245***
			(0.1588)
ecm(-1)	-0.1087*	-0.1365**	-0.1472**
	(0.0632)	(0.0600)	(0.0675)
Diagnostic Test Statistics			
R-Square	0.6774	0.6986	0.7476
F	7.6400	7.8218	7.6068
DW	1.6667	1.6416	1.7266
CUMSUM	Stable	Stable	Stable
CUSUMSQ	Stable	Stable	Stable

ARDL Co-integration Test: Involuntary Financial Exclusion Model:

We estimate the following equation:

$$\Delta FINC\,OUTPUT_t = \lambda_0 + \lambda_1 \sum_{i=1}^{p} \Delta (\text{RURAL}_{POP})_{t-i} + \lambda_2 \sum_{i=1}^{p} \Delta (\text{FE}_{POP})_{t-i} + \lambda_3 \sum_{i=1}^{p} \Delta (\text{AGE GP}_{C\&O})_{t-i} + \lambda_4 \sum_{i=1}^{p} \Delta (\text{FIN ILL})_{t-i} + \lambda_5 \sum_{i=1}^{p} \Delta (\text{RQI})_{t-1} + \mu_1 (\text{RURAL}_{POP})_{t-1} + \mu_2 (\text{FE}_{POP})_{t-1} + \mu_3 (\text{AGE GP}_{C\&O})_{t-1} + \mu_4 (\text{FIN ILL})_{t-1} + \mu_5 (\text{RQI})_{t-1} + \delta_t \qquad eq(3)$$

Now we perform ARDL co-integration test for long run relation among Financial Inclusion and "Involuntary Financial Inclusion" determinants of dimension of Barrier. The test of co-integration among the series was performed by bounds test which shows that calculated F-Statistic is greater than critical value at all levels of significance. Consequently, rejection of null hypothesis is supported by the results which indicate existence of long run relation of facts which effect Financial Inclusion in Pakistan.

ARDL Long-Run & Short Run Estimates: Involuntary Financial Exclusion Model:

The long run & short run coefficients of factors impacting Financial Inclusion are as per Table-10 & Table -11**.** As per results, all the predictors of "Involuntary Financial Exclusion" reveal to be significant in long run and short run. Rural Pop, Female Population and Financial Illiteracy turn-out with negative sign as per expectations. The long run co-efficient value of 0.2881 for Age shows that with 1 percent increase in Age, the Financial Inclusion increases by 0.28 percent**.** Conflicting results are witnessed concerning the impact short run co-efficient of age which is negative as compared to the positive coefficient of long run. However, findings of number of other researchers are in consensus with the result of short and long run as they found non-linear relation of age and Financial Inclusion. Existing literature considers age a significant determinant of Financial Inclusion. The evidence is consistence in showing that young have less chances of financial inclusion (Efobi et al, 2014; Allen et al, 2016; Fungáčová and Weill, 2015; Soumare et al,2016 and

Zins and Weill, 2016). Concerning account ownership, it increases with age. Under the age of 20 are less likely to own accounts at banks and for financial institutions compared to other age groups.

Our results depict that the determinants of Age is positive in long run whereas negative in short run dynamics. Our Age variables (Age Group 0-14, 65 and above) signifies the part of population who are too young or too old to use financial services. Hence, we find non-linear relation among age and Financial Inclusion which confirms Allen et al (2012) conclusion in their global study. We explain the result as resultant of generational effect from demand. On one hand, older age group are less tempted to avail financial services, being not accustomed to using them. On the contrary, banks would add more effort for attracting younger clientele.

The co-efficient of illiteracy suggest a negative relation with Financial Inclusion, with ample evidence in empirical literature that illiteracy negatively impacts Financial Inclusion. Since Education is an important factor related with Financial Inclusion, it has been modeled in number of studies. Sarma and Pais (2011) used literacy as a proxy for education. Honohan (2008), Park and V. Mercado, Jr (2015) modeled literacy rate in their study and found that literacy increases Financial Inclusion. Other studies also show that highly educated adults are more inclined to operate and own an account in comparison to ones with lesser education (Efobi, et al, 2014: Allen et al, 2016; Mohammad et al, 2017). The studies for Asia show that beneficial effect of education on Financial Inclusion does not change among Asian countries.

Since, we modeled illiteracy rate so negative association with Financial Inclusion is in accord with above mentioned studies. The short run co-efficient of illiteracy also generates considerable negative effect on Financial Inclusion with a value of – 0.28.

The co-efficient of “Rural Population” at 0.249 also falls in line with geographical exclusion hypothesis where rural areas are majorly financially excluded. Allen et al (2016) noted that

majority of the poor, young and residents of rural areas are possibly to be financially excluded. Allen et al (2016) also showed that higher level of Financial Inclusion is associated with greater proximity to banks and financial institutions along with lower account cost and strong legal environment.

The gender parity in Financial Inclusion can be elaborated by the co-efficient of "Female Population", where 1 percent increase in "Female Population" implies decrease in Financial Inclusion by 0.41 percent. The results are consistent with the empirical works of several researchers. Number of existing studies show that females are generally financially excluded (Demirguc – Kunt et al, 2013; Aterido, Beck and Iacovone, 2013; Allen et al. 2016; Ghosh and Vinod, 2017; Mohammad et al, 2017). Aterido et al, (2013) found that females are less inclined to utilize financial facilities in comparison to males in to developing countries. Ghosh and Vinod (2017) showed that female headed household have 8 percent lesser chances of accessing formal account compared to male-headed household. Demirguc – Kunt et al (2013) found evidence that difference in account ownership among men and women can be explained by early marriage and violence against women.

Asuming et al, (2019) found that lesser opportunities of formal job constraints women from having accounts as compared to male counterparts and gives rise to lower levels of female Financial Inclusion in developing countries.

The short run co-efficient of Rural Population -0.7244 and FE Population -0.9034, exhibit the same negative relation as of long run. Both the co-efficient of short run are greater in magnitude as compared to long run. We also model RQI as it is a measure for the involuntary barrier of "lack of trust" and measures the effectiveness of banking sector and the government. The long run co-efficient value of 0.2558 for RQI shows that 1 percent increase in RQI, increases the Financial

Table No. 10: Long Run Estimate of Dimension of Involuntary Barriers			
Dependent Variable is financial Inclusion			
	Coefficient	Standard Error	t-Stat
Rural Population	-0.2491**	0.1088	-2.2905
Female Population	-0.4176**	0.1890	-2.2100
Age	0.2881***	0.0491	5.8652
Financial Illiteracy	-0.4396***	0.1289	-3.4107
RQI	0.2558**	0.1213	2.1084
Constant	0.3235***	0.0785	4.1217
Diagnostic			
Normality	0.1804		
Serial Correlation	0.5915		
Heteroscedasticity	0.9382		
Functional Form	0.8617		

Table No. 11: Dependent variable is the financial Inclusion			
	Coefficient	Standard Error	t-stat
ΔRural Population	-0.7244***	0.2295	-3.1560
ΔFemale Population	-0.9034***	0.1248	-7.2414
ΔAge	-0.2439*	0.1328	-1.8369
ΔFinancial Illiteracy	-0.2807*	0.1571	-1.7870
ΔRQI	0.7978**	0.3789	2.1057
ecm(-1)	-0.0607***	0.0078	-7.7507
Diagnostic Test Statistics			
R-Squared	0.7168		
F	8.1250		
DW	1.7167		
CUMSUM	Stable		
CUSUMSQ	Stable		

Inclusion by 0.26 percent. In short run, the responsiveness of Financial Inclusion to a 1 percent increase in RQI is rise of 0.79 percent, thus implies that policy making measures concerning the regulatory framework has formidable importance in improving Financial Inclusion.

The co-efficient of ECM (-1) is significant and negative, exhibiting evidence of co-integration amongst variables of the model. The co-efficient value of -0.0607 suggests that nearly 6percent adjustment will occur in first year and it takes considerable years to converge to its long run equilibrium. After this time, the series will return to its long-term equilibrium.

Diagnostics: The serial correlation test results shown in Table-10 suggest that there exists no parallel or serial correlation. Moreover, the diagnostic test for heteroscedasticity also confirms the absence of this problem, which indicates that model was sound for judging the co-integration among variables.

ARDL Co-integration Test: Banking Determinants of Demand Side Model:

We estimate the fourth model of demand side as per following equation:

$$\Delta FINC\ OUTPUT_t = \eta_0 + \eta_1 \sum_{i=1}^{p} \Delta (\text{DEP F}_{\text{INC}}\ \text{TOT})_{t-i} + \eta_2 \sum_{i=1}^{p} \Delta (\text{DEP MFI})_{t-i} + \eta_3 \sum_{i=1}^{p} \Delta (\text{DEP ROI})_{t-i} + \eta_4 \sum_{i=1}^{p} \Delta (\text{DEP PER SOA})_{t-i} + \eta_5 \sum_{i=1}^{p} \Delta (\text{DEP PERSONAL})_{t-i} + \gamma_1 (\text{DEP F}_{\text{INC}}\ \text{TOT})_{t-1} + \gamma_2 (\text{DEP MFI})_{t-1} + \gamma_3 (\text{DEP ROI})_{t-1} + \gamma_4 (\text{DEP PER SOA})_{t-1} + \gamma_5 (\text{DEP PERSONAL})_{t-1} + \sigma_{it} \quad (eq\ 4)$$

At the optimum lag length of order (1), the F statistic exceeds the critical value at 1 percent significant level. Thus, a strong long run relation is among the variables.

ARDL Long-Run Estimates – Banking Determinants of Demand Side

Next, we proceed to ARDL co-integration for long run estimates of the Banking determinants of demand side. The long run estimates are given in Table -12.

Table No. 12: Long Run Estimate of Dimension of Banking			
Dep FINC	0.6057***	0.1168	5.1835
DEP MFI	0.9724***	0.2789	3.4868
DEP ROI	0.3104***	0.1052	2.9501
DEP Personal	0.9610***	0.2195	4.3781
DEP SOA	0.5806***	0.1662	3.4940
Constant	0.4879***	0.1497	3.2588
Normality	0.4586		
Serial Correlation	0.5873		
Heteroscedasticity	0.2445		
Functional Form	0.7505		

The co-efficient of Deposits of Microfinance (DEP MFI) is 0.972, implying that 1 percent rise in Deposits of Microfinance leads to 0.97 percent rise in demand side of financial inclusion. The results are in line with literature as Kipesha and Zhang (2013) found that financial inclusion in emerging economies was primarily spearheaded by Micro finance Institutes and these MFI's depicted considerable deposit portfolios with banks and a sound repayment capacity when loans were channelized to them by Government owned banks.

We also model other important predictors of Deposits Personal (DEP PER), Deposits Financially Inclusive (DEP FINC), Deposits by Rate of Interest (DEP ROI) & Deposits by Size of Account (DEP SOA).

There is strong evidence in literature for using total deposit accounts instead of saving for measuring Financial Inclusion for considering the broader perspective, where financial inclusion is just not just restricted to opening up of saving accounts but availing other banking products that

encompass current and term account. Kumar (2013) modeled the Financial Inclusion penetration indicator using explanatory variables of APPB, Deposit SDP ratio and Credit SDP ratio and found that Deposit SDP ratio turns out to be significant and positive in determining Financial Inclusion penetration.

Asuming et al, (2019) also modeled bank deposits along with advances and mobile accounts/1000 adult population to assess the financial access depth. The usage dimension in his study comprised of volume of deposits plus volume of credits relative to GDP (Beck et al, 2015). Chen, Feng, Wang 2018 Also modeled the utility of financial services dimension through the composite indicators of deposit balance of Financial Inclusion /GDP and loan balance of Financial Inclusion /GDP; which demonstrated the Financial Inclusion promoted by financial sector.

We constructed the Dep FINC and Dep Personal predictors by considering the current accounts, saving accounts and short-term fixed accounts (from 3-6 months to < 2 Years) and deposit accounts of individuals which are essentially financially inclusive in nature.

The model shows the deposit penetration regression results by focusing on banking activity of demand side while keeping the dependent variable as deposit penetration or gross deposit portfolio. The deposit accounts signify the usage of financial products in a financial eco-system. High deposit levels depict higher investment and banking activities (Beck et al, 2007; The World Bank, 2008 a, b, 2009). The deposit accounts of Dep Finc and Dep Personal show strong and positive impact on financial inclusion of demand side.

The coefficient of DEP PER depicts that a 1 percent increase in Personal Deposits, keeping all else same, will lead to 0.96 percent increase in the gross Deposits portfolio of Banking & The coefficient of DEP FINC depicts that a 1 percent increase in Financially Inclusive Deposits,

keeping all else same, will lead to 0.60 percent increase in the gross Deposits portfolio, together they infer that improvement in consumer deposits reinforces financial inclusion.

Similarly, the highly significant and positive co-efficient of DEP SOA implies that 1 percent increase in low sized, *no frill* deposits contribute to the Financial Inclusion of almost 0.58 percent. *No frill* accounts are primarily basic banking accounts designed for individuals with low income. The structure of no frill accounts encompasses either zero or minimal charges and balances. Several developing countries including Pakistan and India have introduced no-frill accounts, especially on deposit side, with and without value added features. For example, in India, RBI instructed banks to make basic no-frill accounts for extending hassle- free deposit and credit to cliental in rural areas. The guidelines on deposit and credit schemes were simplified terms without insisting on collateral or security (Mohan 2006). The No-frill accounts have witnessed growth in the past few years (Thorat 2007).

There exists an inconclusive debate in empirical literature concerning the relationship of interest rate & financial Inclusion. Asuming et al. (2019) found no relationship exists between deposit generation and interest on deposits through system GMM technique. However, a positive relation was observed through the static model. Our results fall in line with the latter. The expectations concerning ROI on deposit was that higher interest rate encourages people to save and enhance Financial Inclusion. We find a statistically significant positive sign with a magnitude of 0.31 for rate of interest on deposit portfolio.

ARDL Short-Run Estimates – Banking Determinants of Demand Side

Here we present the result of short run and the co-efficient of ECM. The short run estimates are similar in signs as of long run estimates and are in line with priori expectations. The short run

Table No.13: Short Run Results of Banking			
ΔDEP FINC	0.2153*	0.1080	1.9928
ΔDEP MFI	0.7897***	0.2197	3.5943
ΔDEP ROI	0.9077***	0.2840	3.1963
ΔDEP Personal	0.8569***	0.3526	2.4305
ΔDEP SOA	0.9074***	0.2509	3.6164
ecm(-1)	-0.07386***	0.02641	-2.7965
Diagnostic			
R-Squred	0.8443		
F	0.2458		
DW	0.3504		
CUMSUM	Stable		

dynamics are very important due to the co-efficient of ECM. The ECM t_{-1} lagged error correction co-efficient is given in the last rows of table 13, where it is significant with appropriate sign. Therefore, confirming the co-integrating relation among the variables. The ECM t_{-1} co-efficient depicts the pace of adjusting the long run equilibrium after a short-term shock. ECM t_{-1} co-efficient – 0.073 indicates that approximate 7.3 percent of the last year shocks disequilibria adjusts back to long run equilibrium in present year.

Diagnostic Test

Our model qualifies the diagnostic test. The results are present in the lower panel of table 12. The P-values show the non-existence of serial correlation. The P-value, 0.75 of functional form for the model show well specified model and P value of normality 0.45 indicates the acceptance of null hypothesis of normality assumption of residuals.

Composite Measures Approach – Demand Side of Financial Inclusion:

We estimate a comprehensive model of demand side for the purpose of consolidating all the dimensions of the demand side of Financial Inclusion, namely dimension of usage, dimension of Barrier comprising of (i) Voluntary Barrier to "Financial Exclusion" (ii) In-Voluntary barriers to "Financial Exclusion" and micro determinants of the demand side of Banking Sector of Pakistan. For observing their collective impact on Financial Inclusion, we compute the index for demand side of Financial Inclusion by *composite measure approach*. Particularly, we consider Ang (2009) who constructed index with help of principal component analysis by using ratios of financial development, public debt & fiscal deficit to GDP. We construct index and label it as *fInc*.

Long Run Estimates – Composite Measure Approach – Demand Side:

We re-estimate the model and long run estimates are presented in table A along with diagnostic test. The Co-efficient for index of each dimension shows the same sign which we presented in earlier results of demand side.

The results show that the co-efficient for the dimension of Usage, Barrier (Voluntary), Trust & Banking determinants of demand side are highly significant at 1 percent level of significance while Barrier (Involuntary) is significant at 5 percent level of significance. The dimension of usage, contribute to Financial Inclusion by 0.38percent against a unit rise. The dimension of voluntary barrier impacts "Financial Inclusion by 0.547 percent. Similarly, the Involuntary barrier dimensions negatively impacts Financial Inclusion by -0.103 percent. Here it is evident that voluntary barriers to Financial Inclusion have a more negative or deteriorating effect as compared to involuntary barriers. This is an important finding of the study as latest literature on Financial Inclusion also focusses on the phenomenon of self-exclusion.

The trust on the banking sector and the Banking Sector determinants of demand side also have weighted co-efficient value of 0.690 and 0.582. This indicates that regulatory framework and the Bank specific factors, balance sheet channel and financial health of banking sector possesses a considerable impact on the Financial Inclusion landscape of Pakistan. The regulatory framework contribute to Financial Inclusion and government's intervention and implementation can directly impact the level of Financial Inclusion in Pakistan.

It is noteworthy that the Banking determinants stand out with greatest impact on Financial Inclusion stand out with greatest impact on Financial Inclusion which is positive and reinforcing in nature. Thus, results corroborate with the evidence that 85 percent of the 16 percent financially included of Pakistan are served by Banking Sector in terms of financial services and financial products. Thus, the onus of Financial Inclusion lies on Banking Industry where the demand portfolios and micro determinants contribute to Financial Inclusion process.

Short Run Estimates – Composite Measure Approach – Demand Side:

Long Run determinants of financial Inclusion: Composite Measures Approach			
	Coefficients	Standard Errors	t stats
Usage	0.3894***	0.1398	2.784584
Barriers	-0.5472***	0.1410	3.879383
Trust	0.6901***	0.2515	2.744218
Involuntary barriers	-0.1034**	0.0499	2.069391
Banking	0.5823***	0.1026	5.672886
Constant	0.2325***	0.0855	2.719882

Diagnostic	
Normality	0.3068
Serial Correlation	0.4414
Heteroscedasticity	0.6308
Functional Form	0.4111
Note: *, ** and *** show that the coefficients are significant at 10 percent, 5 percent and 1 percent level of significance	

Here we present the result of short run analysis and the co-efficient of the short run estimates are similar in signs as of long run estimates and are in line with priori expectations. The ECM t_{-1} lagged error correction co-efficient is significant with appropriate sign. Therefore, confirming the co-integrating relationship between the variables. The magnitude of short run co-efficient are smaller as compared to long run estimates. This indicates that dimensions have stronger impact on Financial Inclusion in the long run.

Short Run determinants of financial Inclusion: Composite Measures Approach			
	Coefficients	**Standard Errors**	**t-stats**
∆Usage	0.2389**	0.1090	2.1928
∆Barriers	-0.1564***	0.0440	3.5569
∆Trust	0.6374***	0.0944	6.7506
∆Involuntary barriers	-0.2539	0.1995	1.2723
∆Banking	0.7754***	0.1509	5.1391
Constant	0.5417***	0.1911	2.8342

ECM	-0.1075***	0.0292	3.6843
Diagnostic			
R-Squared	0.7688		
F	12.4228		
DW	1.83186		

Diagnostics

The serial correlation test results suggest that there exists no parallel or serial correlation. Moreover, the diagnostic test for heteroscedasticity also confirms the absence of this problem.

1.7 CONCLUSION

Financial inclusion is the process of including the people lacking formal and affordable financial services into the formal financial system. Despite the current focus of policies and regulations devoted to enhancing access to finance in Pakistan, there is a number of underlying factors causing financial exclusion. The main goal of the study was to determine the factors affecting financial inclusion level in Pakistan, and suggest policy measures to improve the level of inclusion. In connection to this purpose, The *First essay* of this study investigated the predominantly neglected dimension of financial inclusion; the *Demand Side of Financial Inclusion*; This study employed number of indicators of demand side for Pakistan; using the emerging *Evidence based approach* of combining theoretical insights with data & employing econometric technique of *ARDL;* we measured the dimensions of demand side, *Usage* and *Barrier;* from two perspectives; *The Banked (Usage dimension)* and *The Unbanked (Barrier dimension)* segments of society. The Unbanked side was further analyzed by bifurcating it in *Voluntary Barrier to Financial Inclusion* and *Involuntary Barrier to Financial Inclusion*. We further developed an *index* for *demand side of financial Inclusion.* The results showed that the co-efficient for the dimension of Usage, Barrier (Voluntary), Trust & Banking determinants of demand side are highly significant. The empirical

findings suggest that voluntary barriers to Financial Inclusion have a more negative or deteriorating effect as compared to involuntary barriers in Pakistan. This is an important finding of study as latest literature on Financial Inclusion also focuses on the concept of self-exclusion.

The trust on the banking sector and the banking determinants of demand side also have high weighted co-efficient values. This indicates that regulatory framework and the Bank specific factors, balance sheet channel and financial health of banks possesses a significant impact on the Financial Inclusion of Pakistan. The regulatory framework contribute to Financial Inclusion and government's intervention and implementation can directly impact the level of financial inclusion in Pakistan. In the light of outcomes of the study, the "Policy Recommendations" are:

- Devising products that are appropriate for disadvantaged segments of society like no-frill deposit accounts; softer loans with low interest rates and frequent small installments; and gender responsive products for women who essentially face high financial exclusion.
- The regulator should play the role of implementing financial inclusion process through strict prudential regulations.
- Women are deeply financially excluded as per our results. The phenomenon of exclusion is more exacerbated in rural population. The regulator must take up the role of creation of gender-responsive financial products to be introduced by the main stream banking sector

From the study it is evident that the Banking determinants stand out with greatest impact on Financial Inclusion which is positive and reinforcing in nature. Thus, results corroborate with the evidence that *85 percent* of the *16 percent financially included* of Pakistan are served by Banking Sector in terms of financial products and services. Thus, the onus of financial inclusion lies on Banking Industry where the demand portfolios and micro determinants contribute to Financial Inclusion proce

"Determining the Financial Inclusion Output of Banking Sector of Pakistan: Supply Side Analysis"

Essay 2

2.1 INTRODUCTION

2.1.1 Introduction

"Financial inclusion implies individual's ability to gain access to and effectively utilize appropriate conventional financial services and products" (Clark et al, 2005). Although it is not rational to assume that all individuals have a preference for using mainstream banking services compared to use of cash, it still is essential to provide them equal opportunity and access to banking services. Thus, the role of banking services, credit and debt in the modern times cannot be disregarded and all players, including market can benefit from the use of formal financial services properly. In particular, the supply side of financial inclusion offer prospects to individuals who can enhance financial stability by borrowing from banks and financial institutions.

The of financial inclusion-supply side comprises of dimension of "Access". Accessibility to financial services presents the possibilities for people to use them. As per theoretical literature, access is one of the crucial aspects for measuring financial inclusion-Supply side. Literature recommends that financial services supply (formal) matters more than the usage or the number of users (Camara and Tuesta, 2014).

Globally the populace that is financially excluded is predominantly in developing countries, with only 41 percent adults having a formal account; only 37 percent of females holding formal account against 46 percent of men; the gender parity further widens because of varying income inequalities among developing countries. For high income countries, account based financial inclusion is much greater with 89 percent of adults holding accounts with formal entities.

Pakistan's financial landscape poses a grim picture of limited financial inclusion. In cross country comparison, Pakistan was ranked the lowest in context of financial inclusion not only in the region but also worldwide when juxtaposed with developing countries with similar demographic and socio-economic profiles. The financial inclusion deprivation in Pakistan is evident from the "Access to Finance Survey 2015" (SBP) which states that "Only 16 percent of the population is financially included. Thus, there is a dire need for financial sector to incorporate processes and informal channels to enhance financial inclusion to marginalized sections of Pakistani's society. Therefore, for the reason of giving the supply side of financial inclusion the due focus, this study tends to investigate for Pakistan's banking sector the association between the Inclusion Output of the financial sector, by using macro/financial variables, supply side financial inclusion determinants & bank specific (micro) determinants.

2.1.2 Research Objective

- To establish the determinants of financial Inclusion–supply side for Pakistan through the mainstream banking sector
- To investigate the impact of supply side dimension of "Access" upon the financial inclusion process for Pakistan.
- To determine if the Banking Sector of Pakistan is inclusive per se.

2.1.3 Significance

The contribution of this study is twofold. First, this study will investigate, for the very first time the financial inclusion process for Pakistan for individual level by supply side – the top down approach by employing number of indicators from data set of supply side; measures the supply side dimension of "Access", a first time secondary data measurement by using data of all 4 Bank types of banking sector of Pakistan.

Moreover, unlike previous studies this study uses not only financial inclusion determinants but also the macro-economic factors, financial development indicators and micro determinants of the stylized banking sector of Pakistan.

Another significant contribution is that this study constructs new variables, especially the micro determinants of banking sector for financial Inclusion; hinging upon & fully supported by theoretical literature; e.g. "Advance Personal of financial Inclusion" which only takes into account the advances which are financially inclusive in nature (credit cards, consumer durable & personal loans).

This study employs an extensive, authentic, secondary data base of SBP (State Bank of Pakistan) in form of *Statistic on Scheduled Banks in Pakistan* and *Hand Book of Statistics on Pak Economy*. Our research shows that improvement in soft consumer loans reinforces financial inclusion and increase in low sized, no frill advances contribute to the financial inclusion process.

2.2 REVIEW OF LITERATURE

2.2.1 Significance of Consumer Credit

Considering the significant role or consumer spending in economic activity, it is presumed that functioning market economy relies majorly on credit availability.

> "Consumer credit may well promote economic growth by permitting the anticipation of purchases and shifting demand toward durable goods industries which have great potential for expansion" (Wallace).

On the contrary failure to provide accessibility to reasonable finance would decrease consumer purchases and impede economic growth. When lending is hindered "the progressive commerce comes to a halt".

However, there is not much evidence on the exact effect of credit availability in low income-high risk consumer groups on the macro economy. There is a possibility that lower level of individual credit market has less progressive impact on economy but this doesn't imply for thinking low of this market as there are several reasons that justify provision of affordable credit to less affluent groups.

Foremost is that credit allows people to avail which they won't be able to afford with their current income; thus, credit can shift the time of cash flow. The credit demand in low income-high risk group is more intense as compared to rich segments by virtue of mismatched income-expense. For vulnerable segments having less spendable income and less saving; the availing of manageable credit to certain limit is unescapable, although not desirable.

Secondly, affordable credit availability acts as a cushion for unforeseen event; a source of transitory income for consumption smoothing. In this context, credit is an external sustenance for individuals who cannot overcome problems on their own. Therefore, non-accessibility to affordable finance is considered as a feature of financial exclusion. However, in spite of the continuous requirement for finance that is existing, it is difficult for some household and individuals to attain finance from banking sector. Ironically, who requires credit the most are often the "least credit worthy" among would be-borrowers. Same applies to Pakistan, where there exists problem of financial exclusion in consumer credit.

The exclusion is evident from figures, e.g., FAS shows that 84 percent of population of Pakistan have absolutely no access to "high street credit" from banking sector. In FAS, it's stated, that there exists a divide amongst conventional financial market and prospective borrowers; data of 2015 showed that mainly low-income individual in Pakistan were impacted by this issue.

2.2.2 Supply Side of Financial Inclusion

Financial inclusion-supply side is a multi-faceted phenomenon and cannot be captured by a single indicator, but established by a greater set of indicators. Literature shows the employment of various indicators of supply side data at country level for determining the access to financial services. The basic indicators used are ATMs/100,000 adults, ATM/1,000 km^2, commercial bank branches/100,000 adults and commercial bank branches /1,000 km^2. These indicators depict the "physical services points" facilitated by financial service providers (banks, rural and agri. banks, saving banks, saving and credit cooperation's, microfinance institutions and money market funds). Certain cross-country studies used the variables of land mass, adult population along with geographic outreach and demographic outreach in terms of supply of services. The studies result suggested that population indicators contain more information in explaining the access dimension of supply side of financial inclusion to geographic (area) indicators.

Another variable of "having loan advance" also depicts a rather consolidated level of financial inclusion as it belongs to that level in hierarchy of availing financial services where such individuals already have utilized other form of financial products such as bank account, pay roll accounts etc.

"Having a loan advance may be a precise measure to identify more advance levels of fin. Inclusion" (Camara and Tuesta, 2014). Literature also shows that efficiency of the financial system is another variable that determines the financial inclusion of the supply side. Efficiency of financial system minimizes the barrier of affordability of the financial services (formal) as efficient financial systems provide services at a competitive price. Further the supply side of financial inclusion is not only dependent upon idiosyncratic financial market features like financial institutions efficiency, stability and also major issues beyond the scope of financial market like governance,

macro factors like GDP, inflation and net interest margin. Financial inclusion highly correlated with net interest margin as shown by the study of Allen et al (2012) where a higher correlation was found in the regression of percentage of adults with GDP per capita and formal account. The result showed R^2 of 0.73 founded on country level regression of account infiltration on the log of GDP/capita.

2.3 MODEL & METHODOLOGY

2.3.1 Financial Inclusion - Supply Side Model

Econometric Methodology

ARDL approach of co-integration by Pesaran et al (2001) is employed to analyze the long run relationship amongst variables. The empirical investigation method of ARDL comprises of three steps. The first step explores the stationarity of variables by using unit roots tests. In the second long-run relationship among the variables is tested. The third step is to study the short run dynamics by "Error Correction Mechanism (ECM)".

Testing of Unit Root

As the initiation of empirical analysis, we test the series order of integration. This step is essential as ARDL technique requires the explanatory variables to be integrated of order I (0) or I (1). If any series is I (2) then Wald (F-test) will generate biased results. Thus, we employ the standard form of Augmented Dicky Fuller (ADF) (Dicky, 1976, Dicky & Fuller, 1979) for checking the non-stationarity assumptions. The ADF unit root test results are shown in Table-1 of *appendix*, suggesting that certain variables which are not stationary at their level but attain stationarity after taking first difference which infers probability of long-run association between the variables.

Lag Length

The ARDL bound testing approach is highly sensitive to selection of lag structure. Generally, the Akaike info criterion, Schwartz-Bayesian information criteria and LR criteria are used. However, most popular is SBC among researches due to its parsimonious nature. We choose appropriate lag based on lowest AIC/SBC values and fix the lag length throughout the model for the purpose of making study comparable.

ARDL Co-integration and Long Run Relation

The presence of long run association is confirmed by restricting the co-efficient of lagged variables equal to zero i.e. null hypothesis of presence of no long-run relation is $\phi_1 = \phi_2 = \phi_3 = 0$. This hypothesis testing is done by F-test under bound testing approach.

Short Run Dynamics

The short run dynamics of model are then explored by "Error Correction Mechanism (ECM) which explain the adjustment process of parameters to long run equilibrium.

2.4 DATA

2.4.1 Data Source & Type

The time series data for Financial Inclusion determinants, micro determinants of banking sector, comprising of 4 categories of Banks (All banks; Commercial banks (scheduled); Foreign banks; Public sector banks) and macro & financial determinants is based on annual data of "Statistics on Scheduled Banks in Pakistan (SBP), "Hand Book of Statistics on Pakistan Economy (SBP)" and "Statistical Publications" (SBP). For Financial Inclusion determinants (demand and supply side) and macro determinants, we use time series data for a period ranging from Dec 1973 – Dec 2017. Whereas for micro determinants of banking sector, data comprising of 4 bank types is employed for a period ranging from Dec 1973 – Dec 2017. For certain variables, the data sources of The Global Economy (UNESCO) & Financial Structure Data set is used.

FINANCIAL INCLUSION -SUPPLY SIDE		
DIMENSION OF ACCESS –SUPPLY SIDE		
VARIABLES	**CONSTRUCTION**	**SOURCE**
TOTAL ASSETS	**TA** (Million Rs)	3. Liabilities and Assets of Scheduled Banks Part1-III, Banking Statistics of Pakistan, Annual, Statistical Publication All Banks, (1973-2017) Dec value
DEMOGRAPHIC OUT REACH BANK BRANCHES/100,000 ADULTS	Out Reach by Population **$DOUT_{POP}$** (#)	12. Distribution of Offices of Several Classes of Scheduled Banks by Population, Part1-XII, Banking Statistics of Pakistan, Annual, Statistical Publication, All Banks (1973-2017)
GEO-GRAPHIC OUT REACH # OF BANKS (TOTAL) # OF BRANCHES (TOTAL)	Out Reach by Area **BNK_{TOT}** (#) **BBR_{TOT}**	Appendix-I a) Scheduled Banks' Offices by Nationality, C. Appendices, Banking Statistics of Pakistan, Annual, Statistical Publication, All Banks (1973-2017)
BANKING VARIABLES – SUPPLY SIDE		
ADVANCES PERSONAL OF FIN_{INC} TOT (A+B+C) (Amount)	As per literature these advances are disbursed to individuals & are financially inclusive in nature **ADV PL_{FINC} TOT_{AMOUNT}** (Million Rs)	3.2 VI Advances Classified by Borrowers All Banks & 4 Bank Types, **# of Accounts & Amount** (1973-2017) Statistics on Scheduled Banks in Pak (SBP)
ADVANCES MICRO FIN INSTITUTIONS (Amount) 4.15 Classification of Scheduled Banks' Advances by Major Economic Groups 1959 onwards	Advances disbursed to Microfinance Institutions which in turn facilitate financial Inclusion **ADV MFI_{AMOUNT}** (Million Rs)	4.15 Classification of Scheduled Banks' Advances by Borrower in handbook from 1960 All banks only & amount only 6-ii (Banks And Other Financial Institution proxy)1973-1981 2-II-F-v (NBFI proxy) 1982-2000 B-III-(ii) (Development Fin. Institution proxy) 2001-2005 B-III-(D) (Microfinance) 2006-2015 All Dec value

ADVANCES BY RATE OF INTEREST (Percent) (Amount)	**ADV ROI$_{AMOUNT}$** (Million Rs)	4.20 Weighted Average Rates of Return on Advances, 1973 onwards (Dec value)
ADVANCES FInc BY SIZE OF ACCOUNT (TOT) (Amount & # of Accounts)	Low sized advances identified against the full range of size of accounts from <5k – 10 mill & above. The threshold selected for financial Inclusion advances is size of accounts from <5k – 1Mill. (Million Rs) **ADV SOA TOT$_{AMOUNT}$** **ADV SOA TOT$_{\# OF ACCOUNTS}$**	6. Classification of Scheduled Banks' Advances by Size of Account Banking Statistics of Pak (SBP) 1973 0nwards for all banks (Dec value)
SUPER INCLUSION UP MARKET **B. SUPER INCLUSION UP MARKET (Total Adv)** AMOUNT BY ALL BANKS NO. OF ACCOUNTS BY ALL BANKS 1963 0nwards for all banks & commercial banks	**S$_{INC}$ UP MKT$_{AMOUNT}$** (Million Rs) **S$_{INC}$ UP MKT$_{\# OF ACCOUNTS}$** **A measure for voluntary exclusion barrier of "lack of access to financial services"** A total of All amount & # of accounts of **Total Advances** above the threshold of Rs. 1 million as bigger loans belong to up market causing super inclusion of rich & advantaged segments of society	6. Classification of Scheduled Banks' Advances by Size of Account Banking Statistics of Pak (SBP) 1973 0nwards for all banks (Dec value)

2.5 EMPERICAL RESULTS

ARDL Co-integration Test – Access Dimension

Unit Root Test

The ADF Unit root results are given in Table 1 of appendix. Certain variables display properties of stationarity, while others do not depict any form of non-stationarity, thus we cannot reject the non-stationarity null hypothesis at their level form. On applying ADF test to first difference of these variables, we obtain stationarity for all. The variable in the supply dimension model are integrated both of order 0 or 1 and thus appropriate for ARDL technique.

Test of Lag Choice Criteria

As stated earlier, the optimal lag length turns out to be one for all models.

ARDL Co-integration Test

We estimate the following equation:

$$\Delta FINC\,OUTPUT_t = \beta_0 + \beta_1 \sum_{i=1}^{p} \Delta (\text{LTA})_{t-i} + \beta_2 \sum_{i=1}^{p} \Delta (\text{LBNK})_{t-i} + \beta_3 \sum_{i=1}^{p} \Delta (\text{LDOUT})_{t-i} + \alpha_1 (\text{LTA})_{t-1} + \alpha_2 (\text{LBNK})_{t-1} + \alpha_3 (\text{LDOUT})_{t-1} + \pi_t \qquad eq(1)$$

We apply the ARDL co-integration for testing the long run association among Financial Inclusion and the "Access" dimension of Barrier. Table 02 presents the results of bounds test. The lower bound and upper bound critical values are obtained. The estimated F-Statistic (Wald) for model is 13.47 which is larger than the lower bound critical value of 3.93 and upper bound critical value of 5.23 at 1 percent level of significance.

Table No. 2 Bounds Tests for Presence of Long-Run Relationship					
	Lags 1	lag3	lag3	1 percent Critical bounds	
				I(0)	I(1)
Model 1	13.4799	9.3698	7.2774	3.93	5.23
Model 2	9.6708	9.1425	6.5658	3.93	5.23
the critical values of last two columns are taken from Pesaran et l. 2001 for Null Hypothesis of no co-integration					

Thus, co-integration exists among the variables in the Access model and we reject the null hypothesis of no long-run relationship. Since the long-run relationship is evident through bounds test approach, we proceed to estimate the long-run equation and co-efficient of the specified model.

ARDL Long-Run Estimates: Access Dimension of Supply Side:

We estimate the long-run co-efficient; first model contains determinants of Access dimension.

The long-run result of ARDL model are given in table-03. All the variables are statistically significant.

For the first generic specification, the co-efficient of log of total asset, *LTA* is highly significant, pointing that a 1 percent increase in assets of banking sector causes an increase of about 0.663 percent in the financial Inclusion of supply side. We employ log of total assets as a determinant of bank size on the lines of Beck et al, (2010) and Uddin, Chowdhury and Islam, (2017).

The total assets of the banks are the prime factors effecting the Financial Inclusion and economic growth by regulating the capital flow. Kosmidou (2008) showed that greater the assets and larger the size of the banks, more capability to reach greater population and enhance Financial Inclusion.

The long run estimate show that number of banks LBNK is statistically significant and shows a positive relationship with Financial Inclusion measure & geographic out reach of Banks. The co-

efficient is reported at 0.862. There is a strong evidence in literature for using no. of bank/branches as a determinant of financial inclusion of the supply side. The literature cites physical distance between the individual and financial services point as an critical determinant of financial inclusion (Allen et al, 2014). The pervasiveness of outreach of the banking sector is measurable by bank branch network, Agents and ATM's (Mostak and Sushanta, 2015).

The coefficient of demographic outreach (DOUT) equals 0.844, highly significant at 1 percent, confirming a reinforcing association among the variables. This suggests that a 1percent rise in DOUT will cause financial inclusion to increase by 0.84 percent.

Table No. 3 Long Run Estimate of Supply Side-Model 1-Access Dimension

	Coefficient		**Standard Errors**		**T-stats**
LTA	0.6630*		0.3719		1.7829
LBNK	0.8628**		0.4049		2.1307
LDOUT	0.8448***		0.1480		5.7097
Constant	0.5365		0.5773		0.9293
Diagnostic					
Normality	0.6205				
Serial Correlation	0.2223				
Heteroscedasticity	0.5042				
Functional Form	0.1684				
Note: *, ** and * depicts 10 , 5 and 1 percent level of significance**					

On the contrary, the study of Kumar (2013) showed that branch density (APPB) had a negative and significant effect on financial inclusion. The outcome suggested that though the credit and

deposit accounts improved over time, its penetration failed to match the population growth that was witnessed thus generating a negative impact. Since commercial banks take a leading role in provision of access to finance, we use the penetration of the banking sector as a measure of access to finance.

ARDL Short-Run Estimates: Access Dimension Model:

Table 04 summarizes the short run parameters of the "Access Dimension Model".

Again, the elasticity's of the supply model are significant majorly at 1 percent and 5 percent level of significance. It implies that the series is non-explosive in nature and long run equilibrium is attainable. The coefficients reveal that 9 percent dis-equilibrium in Financial Inclusion function of the current time will be amended in the next year.

Table No. 4 Short Run Estimate of Supply Side _Model 1			
	Coefficient	Standard Errors	T-stats
ΔLTA	0.5867***	0.1372	4.2764
ΔLBNK	0.1961***	0.0495	3.9627
ΔLDOUT	0.2307**	0.1080	2.1367
Constant	0.8279	0.5773	1.4340
ecm	-0.0974***	0.0214	-4.5449
Diagnostic			
R2	0.7466		
F-STATs	9.9048		
DW	1.7379		
CUMSUM	Stable		
CUSUMSQ	Stable		
Note: *, ** and * depicts 10 , 5 and 1 percent level of significance**			

Diagnostics: The validity of results hinges upon goodness of fit and steadiness of the model, hence table 3 summarizes the result of diagnostic check. The reported residual diagnostic of the "Access

Model" show normally distributed residuals. The stat also reveals no autocorrelation in the model appears as non-heteroscedastic due to passing hetero test.

ARDL Co-integration Test: Banking Determinants of Supply Side Model:

We estimate the fourth model of demand side as per following equation:

The test of "Unit Root" indicates integration of order (1) or order (0) in all series, with no exception of any series integrated of order (2). This allows for testing the long run association among financial inclusion and Banking determinants of Supply side by employing Bounds testing. Equation (1) is calculated using OLS and long run relation of equation (2) is established by calculating joint F-Statistics.

$$\Delta FINC\ OutPut_t = \varphi_0 + \varphi_1 \sum_{i=1}^{p} \Delta (\ LADVMFI)_{t-i} + \varphi_2 \sum_{i=1}^{p} \Delta (LADVPER)_{t-i} + \varphi_3 \sum_{i=1}^{p} \Delta (LADVROI)_{t-i} + \varphi_4 \sum_{i=1}^{p} \Delta (LADVSOA)_{t-i} + \varphi_5 \sum_{i=1}^{p} \Delta\ (LSIAM)_{t-i} + \theta_1 (LADVMFI)_{t-1} + \theta_2 (LADVPER)_{t-1} + \theta_3 (LADVROI)_{t-1} + \theta_4 (\text{LADVSOA})_{t-1} + \theta_5 (\text{LSIAM})_{t-1} + \mathcal{E}_t \qquad eq\ (2)$$

The F-Statistics calculated along with critical values proposed by Pesaran et al (2001) at significant levels are as per Table-2 of Access dimension model. At the optimal lag length of order (1), the F statistic surpasses the critical value at 1percent significant level. Thus, a strong long run association is among the variables.

ARDL Long-Run Estimates – Banking Determinants of Supply Side

Next, we proceed to ARDL co-integration for long run estimates of the Banking determinants of supply side.

The long run estimates are given in Table -5.

The co-efficient of Advances to Microfinance (LADV MFI) is 0.319, implying that 1 percent rise in Advances to Microfinance leads to 0.3 percent rise in financial inclusion-supply side. The results are in line with literature as Kipesha and Zhang (2013) found that in developing countries financial

Table No. 5 Long Run Estimate of Supply Side Model 2			
	Coefficient	**Standard Error**	**T-Stat**
LADVMFI	0.3193*	0.1677	1.9046
LADVPER	0.5322***	0.1665	3.1965
LADVROI	0.8362***	0.1956	4.2755
LADVSOA	0.4861***	0.1980	2.4557
LSIAM	-0.2879**	0.1274	-2.2597
Constant	0.1037***	0.0177	5.8598
Diagnostic			
Normality	0.6583		
Serial Correlation	0.7321		
Heteroscedasticity	0.5817		
Functional Form	0.1178		

inclusion was primarily spearheaded by Micro finance Institutes and these MFI's depicted considerable advances & deposit portfolios with banks and a sound repayment capacity when loans were channelized to them by Government owned banks.

We also model other important predictors of Advances Personal (LADV PER), Advances by Rate of Interest (ADV ROI) & Advances by Size of Account (LADV SOA) & Advances Super Inclusion (LSIAM). The coefficient of LADV PER depicts that a 1percent increase in Personal Advances, keeping all else same, will lead to 0.53 percent increase in the gross advance's portfolio

of Banking, which also infer that improvement in soft consumer loans reinforces financial inclusion.

Similarly, the highly significant and positive co-efficient of ADV SOA implies that 1 percent increase in low sized, no frill advances contribute to the Financial Inclusion of almost 0.486 percent. *No frill* advances are primarily designed for individuals with low income. Through Bank-specific view analysis, it is evident that the problem of NPL's is largely affected by size of loans & bank management structure.

There exists an inconclusive debate in empirical literature concerning the relationship of interest rate & financial Inclusion. Certain studies showed a negative relationship of interest rate and financial inclusion whereas some favor positive relationship between the both. Our results fall in line with the latter. We find a statistically significant positive sign with a size of 0.836 for rate of interest for loan portfolio.

We also model Super Inclusion of Up-market in the financial Inclusion-supply side model. The Super Inclusion exhibits negative relation with financial Inclusion & unit rise in large size loans decreases the financial Inclusion of supply side by 0.28 percent. The relationship is same as we modeled it in the demand side. However, the coefficient size is larger in demand analysis. The results are consistent with Espinoza and Prasad (2010) showed that increased sizes of loans have a negative impact on NPL's, and it is harder for bank officials to tackle with the repercussions of timely credit risk. Scrutiny of bank's views, indicate that increase in NPL problem could be affected by size of loans & bank management (Guan et al. (2017).

ARDL Short-Run Estimates – Banking Determinants of Supply Side

Here we present the result of short run and the co-efficient of ECM.

Table No. 6 Short Run Estimate of Supply Side Model 2					
	Coefficient		**Standard Error**		**T-Stat**
ΔLADVMFI	0.2601***		0.1000		2.6022
ΔLADVPER	0.5099***		0.1485		3.4331
ΔLADVROI	0.1518***		0.0213		7.1313
ΔLADVSOA	0.3162*		0.1820		1.7375
ΔLSIAM	-0.2333***		0.0832		-2.8048
Constant	0.8297**		0.3535		2.3468
ecm	-0.09939**		0.04815		-2.0642

The short run estimates are similar in signs as of long run estimates and are in line with priori expectations. The short run dynamics are very important due to the co-efficient of ECM. The ECM t_{-1} lagged error correction co-efficient is given in the last row of table 6, where it is significant with appropriate sign. Therefore, confirming the co-integrating relation between variables. The ECM t_{-1} co-efficient depicts the pace of adjusting the long run equilibrium after a shock in the short term. ECM t_{-1} co-efficient – 0.993 indicates that approximate 10percent of the last year shocks disequilibria adjusts to long run equilibria in present year.

Diagnostic Test

Our model qualifies diagnostic test. The results are present in table 5. The P-values show the non-existence of serial correlation. The P-value, 0.1178 of functional form for the model show well specified model and P value: of normality 0.6583 indicates the acceptance of null hypothesis of residuals normality assumption.

2.6 CONCLUSION

The *second essay* of this study gave the *Supply Side of Financial Inclusion* the due focus and investigated the financial inclusion process for Pakistan by supply side – the top down approach by employing number of indicators of supply side; measured the supply side dimension of *Access*, a first time secondary data measurement by using data of all bank types of banking sector of Pakistan. In this context, the study dealt with the socio-economic and financial factors determining financial inclusion in Pakistan. The empirical findings suggest that the greater size, geographic outreach & demographic outreach of the banks, the greater the contribution to the financial inclusion. We also modeled other important predictors of Advances Personal (LADV PER), Advances by Rate of Interest (ADV ROI) & Advances by Size of Account (LADV SOA) & Advances Super Inclusion (LSIAM). The results signify that improvement in soft consumer loans reinforces financial inclusion and increase in low sized, no frill advances contribute to the Financial Inclusion

We also investigated Super Inclusion of Up-market in the supply side model of financial Inclusion. The Super Inclusion exhibits negative relation with financial Inclusion & unit rise in large size loans decreases the financial Inclusion of supply side.

Our findings have several implications and policy recommendations. First, as promoted by the United Nations, the building of an inclusive financial system is a significant way to achieve the SDGs and to uplift the worldwide economy. At the macro level, the Government of Pakistan should play a constructive role by incorporating financial inclusion into national development strategies. Additionally, the relevant legislative and regulatory work required to help with this achievement should be improved. At the meso-economic level, society should play its role in constructing a poor-friendly financial infrastructure which can provide affordable financial

services to them. At the micro level, development of micro finance should be focused upon to improve financial inclusion.

Second, for Pakistan which is at a low stage of financial inclusion progressiveness, the government should promote the opening up of domestic financial markets which has the ability to absorb the positive effects of the international financial inclusion development. Global financial market synergy and linkage can help to absorb these spatial spillover effects brought on by developed countries. Third, according to empirical results, total assets of banks, the bank network and the demographic out reach of banks significantly and positively enhance financial inclusions process from supply side dimension. Also advances to individuals and size of loans also has impact on financial inclusion while collateralized loan being in appropriate product have negative impact on financial inclusion process. The banks must consider these aspects while devising products for larger masses. Finally, Pakistan should strengthen its ties with international financial organizations like Alliance for Financial Inclusion (AFI) and GPFI to exchange experiences for the purpose of developing effective financial inclusion strategies.

To overcome the disconnect of *Access* & *Usage*, where access essentially does not translate into Usage & to ensure mass access to financial services, financial literature can prove instrumental to overcome the problem of informal lending and its associated risk. As educated persons essentially informed about the benefits of using the formal financial system, they are more likely to use those. Therefore, policy alternative should be designed to communicate the benefits of financial service to non-users and making them financially literate.

Impacts of Financial Inclusion on Non-Performing Loans of Banking Sector

A Multifactor-Model for Pakistan

Essay 3

3.1 INTRODUCTION

The most dramatic Global Financial Crisis (2007-2009, 2011-2012) showed the world that enormous liquidity issues in the interbank market were created by mortgage NPL's & eventually caused fall of major financial markets & collapse of economies. The largest contraction of economic activity was caused by shocks that exploded in the banking sector, while macro shocks played a restricted role (Gerali, et al. 2010)

Number of researches by Bernanke blamed the collapse of banking industry responsible for the occurrence & tenacity of "Great Depression" where from 1930 to 1933, all the US financial markets crashed & half of the US banking sector failed. (Bernanke 1986; Schreft 1990; Bernanke and James 1991). For Asian financial crisis of 1997, banking sector proved to be the root cause when defaults erupted in the banking industry of East Asia by approximately 25 percent of total credit portfolios (Caprio and Klingbiel 2002)

Historically, financial & banking upheaval have been associated with enormous accumulation of NPL's constituting a considerable share of total assets of defaulting banks/institutions during the systematic crisis; a high alert emergency situation for banks, of which, unluckily the world has seen 114 occurrences taking place in nearly 91 countries since 70's (Dziobek and Pazarbasioglu 1997)

In the context of fragility of Banking sector due to explosive nature of NPL's, the emergence of financial Inclusion on the horizon, the delivery of financial amenities & products to masses further

complicates the scenario & raises crucial question whether financial Inclusion is *less risky-sound investment* or *high risk-bad investment* for banking sector?

There is a need to predominantly view the dilemma in the context of developing economies where sources of Non-Performing Loans & impact of on-boarding masses with banks under the flag of financial Inclusion must be analyzed to gauge the indicators leading to the crisis & intensity of crisis rather than to be seen as "consequence of crisis". Like Demirguc-Kunt and Detragiache (1998) classified financial pressure period as full crisis episode instead of an indication of crisis if NPL to total asset ratio surpasses 10percent.

3.2 SIGNIFICANCE & HYPOTHESIS

The significance of the subject study lies in analyzing the impact of financial Inclusion on credit risk of banking sector of Pakistan where *NPL to Total Advances ratio* is used for determining credit risk.

We investigate for Pakistan; where 16 percent are financially included & 85 percent of these 16 percent are served by banking sector; whether credit risk of banking sector increases or decreases due to financial inclusion; determine whether financial Inclusion is *less risky-sound investment* or *high risk-bad investment* for banking sector of Pakistan.

For developing economies Non-performing loans have been an exacerbated phenomenon. The banking crunch initiating from NPL accumulation have impacted economies where there was governments indulgence in too much borrowing from banks and created a substantial portfolio of non-performing loans; (Basu 1998). In these countries, banks demonstrate power, they function in a considerably concentrated markets with heavily skewed loans portfolios towards selective sectors and corporate giants; (Brownbridge 1998). In such circumstances financial retrenchment can take place, can impact the banks with greater capital levels.

All of these scenarios are applicable for Pakistan; an economy with a stylized banking industry exists under monopolistic competition structure of market; where government acquires sizeable portion of private sector credit & crowds out private investment; where commercial banks have a preference for extending loan to government (risk free) for enhancing Credit Adequacy Ratio; where corporate loan portfolios of the banks are biased & inclined toward specific corporate sector giants; where loss making public enterprises are financed by public sector banks; all taking place in a market where there is a dearth of corporate governance.

For Pakistan, most of research concerning the banking sector has been about *"Pass–through mechanism"* (Khan and Khawaja 2005 and Mohsin 2011) & *"Spreads"* (Khan 2009; Khawaja and Din 2007)**.**

Concerning the banking sector of Pakistan, we intend to explore the effect of financial inclusion upon credit risk; whether credit risk of banking sector is affected; by financial Inclusion determinants of supply side, the "access" dimension; by bank specific variables and is the credit risk of banking sector of Pakistan of significant level that hampers Financial Inclusion?

3.3 LITRATURE REVIEW

After the GFC, the global intelligentsia of developing and advanced economies put forth the priority agenda of "Banking Stability" (Beck et al. 2009). Fluctuation of the international financial system is a point of concern and number of countries have prioritized financial sustainability over financial expansion, as instability fosters un-sustainable growth over longer period of time (Schneider 2008). However, while systematic banking crisis concerns the policy makers more, the individual bank vulnerability can also be perturbing as number of systematic banking crisis initiate as distress in the different banks. The banking sector plays a central role in economy by carrying out the prime activities of lending money, taking deposits and offering transfers. The banks also

play crucial role in transmitting financial policies of government especially monetary policy (Ongore and Kusa (2013). Contrary to other industries, the banking sector products are intangible, causing risks and revenues difficult to estimate, precisely. Accompanied with volatile aspects of high profits and risk, the banks can not only stimulate but can also impede the growth of economy. Yet, profits and risks of banking industry are not antagonistic, they are narrowly associated. For purpose of attaining high profits, numerous banks try to achieve more clients and retain earning constancy by broadening the scale of loans portfolio, the largest source of banks income and most important asset of commercial banks. The loan portfolio quality determines the bank's profitability (Ongore and Kusa (2013). The main risk faced by the bank is loss originating from delinquencies or non-performing loans.

For the banks to effectively perform the essential function of liquidity provision, they must show stability. In developing economics like Pakistan, commercial banks are the dominant financial intermediaries, whose deposit portfolios present a substantial constituent of money stock. For Pakistan, an agenda item of SBP is to nurture financial sustainability via regulation.

3.2.1 THE CREDIT RISK OF BANKING SECTOR

The loans which fail of create income for considerable period of time i.e. interest & unpaid principal of such credits remains due for at-least 90 days are referred as NPL's (Caprio and Klingebiel 1999). The definition of NPL varies among Central Banks due to multicity of institutions & regulators across countries & wide dissimilarities in minimum mandatory capital thresholds among economies (Bloem and Gorter 2001). Central Banks normally view the time frame of 90 days & above for conversion of standard loan to doubtful/loss making loan, where the doubtful loan is the one where debtor is not in a capacity to make the repayment & loan remains unpaid for six month or so. For other Central banks, NPL are the ones where principal & interest

is un-paid for at least 3 months. However, Basel accords stress upon an internal rating & standardization approach hinging upon aligning risk management techniques with banks capital requirement. Basel put forth a minimum internal evaluation criterion which forms the reliability of credit risk valuation of banks. This standardized calibration leads to NPL classification & homogeneity across economies.

The financial implications of NPL are significant. Non-performing loan drastically affect the investment, create credit crunch for private sector due to decrease in banks' capital, decrease in saving rates & higher provisioning to compensate the losses (Gerali et al. 2010)

NPL's affects both the supply & demand side by decreasing consumption & creates economic contraction where deposit protection is missing to protect small account holders. The existing research of NPL's comprises of two main perspectives, macro-economic factors & bank specific factors.

3.2.2 MACRO ECONOMIC FACTORS

For the purpose of defining more determinants of NPL's the researchers focused upon the factors from a macro-economic view point. Salas and Saurina (2002) showed considerable association between GDP, bank size and growth of NPL's of banks. Festic et al. (2011) studied the link between macro variables and banking sector systematic risk and found out that economic functioning act as an overheating signal which promotes the NPL ratio. Messai and Jouini (2013) established that in reasonable financial situations, unemployment ratio and real interest rates could precisely increase the NPLs, which depicts the effect of stability of demand/supply on banks asset quality. Mileris (2012) analyzed the effect of macro factor on asset quality of bank from credit risk point of view and established that interest rate and unemployment rate considerably stimulate creation of NPL's. Beck et al. (2015) utilized several nationwide samples to study the impact of

macro elements on NPL's and showed that exchange rates, GDP growth, interest and stock rates substantially decrease the scale of NPL's, whereas the negative impact of the stock prices is far more robust in advanced economies. Konstantakis et al. (2016) took features of financial catastrophe to study the causes of NPL's. He showed that financial and macro-economic characteristics considerably impact NPL's.

3.2.3 BANK SPECIFIC FACTORS

Apart from macro aspects, a number of studies stress importance of bank-specific characteristics, as macro-economic variables, in turn are dependent on micro-economic characteristics. Salas & Saurina (2002) studied that bank size, market power & capital ratio accounted for NPL's along with macro factors. Number of researchers' analyzed relationship between NPL's and bank specific factors. Quagliariello (2007) examined the association among the NPL's and provision of loan loss from business cycle perspective and learned that business cycle significantly impacts the risks and earnings of the banks. Podpiera and Weill (2008) showed that cost efficiency is directly reduced by poor management of banks and creates more potential risk, leading to rise of loan loss ratio. Shehzad et al. (2010) analyzed determinants of NPL and showed the ownership and regulatory style have substantial impact upon size of NPL. Espinoze and Prasad (2010) depicted that enhancing loans size generates lagging impact on NPL's making it harder for banks to timely handle the repercussions of credit risk. Louzis et al. (2012) found that bank management's quality considerably enhances NPL's". Ghosh (2015) found robust relationship between asset size, liquidity risk and cost efficiency of banks and NPL's that in-turn is impacted by social characteristics. Bercoff, et al. (2002) showed that operational efficiency, loan portfolio & asset development are reasonable explanation for NPL's. Hughes et al. (1995) links operational efficiency of banks to credit risk.

Considerable NPL can also occur when capital to asset ratio declines. The capital/asset ratio is measure of asset quality, an indicator of financial soundness & a shock absorber during financial crisis. Lower capital/asset ratio depicts credit risk magnitudes faced by banks & lower levels of equity depicts the constraints banks are exposed to against future losses & potential risks. As per International standards, the ratio should be higher than 8percent (minimum required) however, number of countries are not able to meet this threshold.

3.2.4 FINANCIAL INCLUSION:

For the purpose of solving financial problems at mass scale, the idea of financial inclusion contributes to reducing breach between the rich and poor. The introduction of financial inclusion provides increased economic access and services to greater people and allows them to reduce economic problems. In constructing inclusive financial framework, interaction among users and banks/economic institutions is central in stimulating financial sector growth. This inclusive financial system enhances capital flow and ensures a security for capital stock of enterprise system, where more and more users are availing financial services that they require.

Concerning the research, Financial Inclusion has been analyzed from three dimensions, since 2005, when the concept was introduced; the meaning and the role of financial inclusion and the measurement of financial inclusion. Concerning the definition, researchers pay more attention to the elementary aspects of the concept and to the inclusive framework of financial markets. Chakarvarty and Pal (2013) pointed that “this type of financial system can methodically increase the financial institutions inclusiveness and facilitate greater consumers to attain financial services”. Compared with the research on defining financial inclusion, the studies concerning role of financial inclusion presents its principal worth. Turvey and Xiong (2017) studied rural China e-commerce and how it is impacted by financial inclusion. He showed that it enhances rural business.

Corrado and Corrado (2017) analyzed the connection among inclusiveness of economic institutions and financial inclusion, revealing that Financial Inclusion promotes investment and consumption plans, rather ensuring a security for stable economic growth. Zhou et al. (2018) examined the association of economic progress and financial inclusion, showed that economic functionalities are promoted by financial inclusion concerning distribution of economic resources. Other researches strengthen the concept of penetration of financial market and maintenance of social constancy, like Raddatz (2006) points that financial inclusion solves the issue of reducing the breach between the poor and rich, reinforcing social sustainability. Beck et al. (2007) studied how financial inclusion influences people, indicating that refining the financial market frame work can convey increased financial services and products to users that enables them to lessen their financial difficulties.

For measurement of Financial Inclusion, researchers consider numerous economic aspects and are continuously doing efforts to incorporate the factors in financial inclusion index for improving accuracy and universality of measuring techniques. For measurement, primarily, three dimensions are used; availability, accessibility and usage. The dimension of "availability" accounts for the financial system out-reach in the shape of bank's outlet, as distance covered to the financial services point proves as a crucial hindrance to financial inclusion (Allen et al. 2013). "Availability" is represented in the forms of bank branch network penetration, agents, ATM's (Mostak and Sushanta 2015). For "Accessibility" the volume of banks loans, deposits and mobile accounts per one thousand adults has been employed to incorporate the level of financial accessibility. The dimension of "Usage" includes volume of deposits and credits relative to gross domestic product (Beck et al. 2015). Based on holistic approach Sarma (2011) built a financial inclusion index stressing that precise measurements require "usability and availability" of services and products.

Gupte et al. (2012) employed aspects of extension, use, financial transactions cost and convenience to improve financial inclusion measurements. Wang and Guan (2017) highlighted the measuring technique and found that correlation exists among the multiple dimensions of financial inclusion.

Researchers also investigated the aggregate level impacts of financial Inclusion. Studies revealed that micro effect of financial inclusion translates in shape of increased financial services & better solutions of user's capital issues, improved consumption & convenience of use (Corrado and Corrado (2017). Concerning the macro impact, facilitation of economic services enhances number of channels for users & enables equitable & more balanced distribution of resources (Chakarvarty and Pal 2013)

3.2.5 CREDIT RISK:

The prime function of banking sector and inclusive financial system is provision of financial services and products to consumers by meeting their financial needs. However, while endorsing financial inclusion, the financially inclusive framework can give rise to certain possible risk, causing further issues of asset quality problems.

Among the potential risks, credit risk is the foremost risk facing banks that affects the quality of assets and results in NPL's. As per the impact of GFC, it is evident that not only credit risk effects the economic growth of various countries but also creates a domino effect within interacting net of these economies. Contrary to advanced countries, banking sectors of developing economies are under developed, so these economies face a greater risk. Moreover, in these developing economies, banks are at the core of financial markets so risks of the banking sector can impact economic growth of these economies. In this context, essentially, credit risk & financial Inclusion nexus needs to be explored.

3.2.6 CREDIT RISK & FINANCIAL INCLUSION:

According to literature, magnitude of financial inclusion influences stability. Enhancing financial access by financial inclusion alters the cliental structure in terms of borrowing, saving activities. These alterations promote financial sustainability via diversification of risk (Hannig and Jansen, 2010). But, if this financial expansion is towards uncredited non-worthy clients and unfamiliar territories, then this poses a looming threat of financial instability and potential increase in credit risk. Mehrotra and Yetman (2014) analyzed that financial steadiness enhances faith in financial markets and improves financial inclusion. On the other hand, an exceeding focus upon financial sustainability prolongs "Involuntary financial inclusion", particularly during regulatory contraction when attempts are made to lift profits and reduce risky cliental.

The theory of Financial Inclusion also explains the association of financial inclusion and credit risk of the banking sector. Theory of Diamonds (1984) explains how banks perform the role of mediators among savers and borrowers. Banks offer financial accessibility, financial utilization and diversification as financial intermediaries. Financial intermediation is the degree by which institutions (financial) bring together surplus and deficit spending elements (Ndebbio 2004). Banks effectively execute the role of monitoring borrowers Diamond (1984) where decreased costs of monitoring offers relative advantage. Diamond and Dybvig (1983) also studied liquidity status which is conversion of non-liquid assets in liquid ones by the banks. Alike investors are risk averse & are not certain about the time of their consumption requirements in future. In the absence of intermediaries, investors are sealed up with longer term illiquid investments, yielding increased returns to the ones who will be consuming later.

The financial inclusion influence upon bank's credit risk is also assessable from "financial asymmetry theory" angle. Asymmetric information emerges when one party in a debt agreement

is better informed than the other one. The theory proposes that it is hard to differentiate good borrowers from not-good borrowers (Akerlof 1970). Richard (2011) suggested that moral hazard and adverse selection originating from unequal information among lenders and borrowers contributes to credit contractions, therefore disturbing stability and performance. Moral hazard contributes to NPL's & is a risk where a stakeholder in a transaction; gives distorted info concerning its credit capacity, liabilities and assets. Adverse selection is where lenders are not able to differentiate amongst debtors having dissimilar risk levels and where there are limited loan-contracts. It causes repayment of loan by borrowers only when they possess the ability & thus results in substantial buildup of NPL's (Bofondi and Gobbi, 2003). Moreover, Financial Inclusion comes with admittance of numerous customers, inexperienced and new to the commercial banking sector (Hannig and Jansen, 2010) creating a challenging situation in the market of loans as lenders encounter problems in establishing whether the client is a low risk, thus intimidates financial stability and performance.

Financial inclusion extends the entrepreneurial life cycle by flourishing credit to small firms that lack liquidity (Rajan and Zingales 1998) where borrower continue to pay their interest & principal. However, expensive liabilities & relative instability may arise from this type of "whole sale funding", paving way for potential credit risk, originating from inclusiveness (Demirgüç-Kunt, and Huizinga 2011; Poghosyan, and Cihak 2011; Huang and Ratnovski 2011) e.g. during GFC, the more the banks relied upon 'whole sale funding", the more fragile they turned out in terms of credit risk (Poghosyan, and Cihak 2011)

So, it turns out to be harder for banking sector to determine whether financial inclusion is less risky-sound investment or high-risk bad investment. Thus, whether, inclusive financial framework

brings more credit risk in the course of enhancing financial inclusion needs more research and analysis especially in terms of non-performing loans.

3.2.7 NPL & FINANCIAL INCLUSION:

NPL's of commercial banks have restricted the expansion of banking sector to a certain level and are direct indication of credit risk and asset quality. In order to address this issue, banks had to decrease the magnitude of credits, which then deteriorates certain cliental economic standing. Considering NPL creation view point, an important cause for asset quality problem is "absence of user's solvency". With continual advancement of financial sector, the introducing of financial inclusion significantly relieved the lack of funds and bridged the divide amongst poor and rich. At financial inclusion core lies the delivery of increased financial amenities to more and more users. However, taking into account the similarities between the banking sector & Inclusive financial system, it can give rise to the potential risk of NPL's. From banks viewpoint, user's financial problem solving is beneficial if they are solvent. This solvency also defines the duration of co-operation between the banks & the users. On the contrary, user insolvency translates itself in the form of Non-performing loan; a scenario that every Commercial bank tends to avoid.

According to few existing researches focused on Financial Inclusion and NPL's, there exist a significant negative association among commercial banks NPL's and inclusive finance after global financial crisis, whereas effects during and before the crisis are insignificant.

In lieu of regional advancement, understanding the influence of NPL's of conventional banks from regional angle can aid planners and controllers in emerging economies to manage the asset quality of banks. The development of banks and regional consumption can substantially improve the effect of financial inclusion, whereas unemployment and intervention of government can decrease the effect of financial inclusion. As per regional sample analysis, Financial Inclusion promotes the

NPL's of commercial banking; whereas at lower levels of financial inclusion, growth of commercial banking serves as dis-incentive to NPL's.

Additionally, the development of financially inclusive structure can improve the relations among financial institutions and users, thus expanding space of financial products and services. The question that financial inclusion influences NPL's of banking sector is not just the concern of policy makers but also a concern of researchers and regulators. Examining this relationship of Financial Inclusion and NPL's will provide a better realization of optimum allocation of economic resources; avoiding the wastage and eventually facilitating construction of financial system.

3.3 METHODOLOGY

3.3.1 THE MEASUREMENT OF CREDIT RISK

Goldstein and Turner (1996) found out in their study that non-performing loan accumulation is caused by various macro factors inclusive of macroeconomic downturns and volatility, per capita GDP, increased inflation and interest rates, appreciation of exchange rate, declining terms of trade and moral hazard. Other studies also included banking variables along with macro factors, for the logic that macro-economic characteristics in turn depended upon micro-economic factors.

The methodology of multifactor model & logit model will be applied to banking sector using a set of financial inclusion variables which include Advances portfolios, Banking transactions & outreach by Banks and bank specific micro variables, including CAMEL category determinants of SETA, RETA, WCTA and Net income (NI), a dummy variable, having the value of 1 if the net income remains negative for consecutive two years, 0 otherwise (INTWO).

Since Pakistani banking sector is unique due to its stylized features; market power; interest rates stickiness: accumulation of bank capital: is unique due to its stylized products, loans and deposits contracts; homogeneous financial products from a composite basket, differentiated at different

prices: is also unique due to its stylized credit risk (only banking and insurance sector have to deal with both the idiosyncratic and systematic risk where the former is non-diversifiable) and balance sheet composition, we set log of NPL Gross advances measurement of credit risk of banking sector.

3.3.2 The Model

For exploring the effect of financial Inclusion factors & bank specific variables on Credit risk of banking sector of Pakistan, the following multi factor model is set.

NPL's are assumed to follow a model in the form

$$NPL/GA_{it} = a_i + \sum_{k=1}^{K} \beta_k f_{kt} + e_{it} \qquad (4.1)$$

Where

a_i = *Constant term*
β_{ik} = *financial Inclusion supply side determinant k for banking sector*
f_{kt} = *realization on factor k in time t*
e_{it} = *error term*

Initially (Log) NPL/GA_t is regressed upon financial inclusion determinants of the supply side which affect NPL systematically. The explanatory variables are Financially Inclusive Personal Advances, Advances to Microfinance Institutions, Financially Inclusive Advances by Size of Account, Electronic Banking Transactions, Demographic outreach by Banks, Financially Inclusive Advances by Rate of Margin, Super Inclusion Up Market Advances & Number of ATM's.

3.3.3 Credit Risk & Volume of Financial Inclusion- The Indirect Approach Model

The multifactor model presents the association among the credit risk of banks & bank's sensitivity to supply side financial inclusion determinants. In the process, changes in determinants of supply side of financial inclusion and bank sensitivity to those variations affect the NPL to Gross advance ratio, which in turn impact the probability of bank's credit risk.

Using two step logit discriminant model in the tradition of Maddala (1986), Thomson (1992) and Theodossiou et al. (1996), we estimate the NPL to Gross advance ratio which will be used as

depiction of financial Inclusion sensitivity indicating credit risk of banking sector of Pakistan. In short, bank's (Log) Non-performing loan to Gross advances ratio presents financial Inclusion-supply side effects integrated in micro crisis model. Following is the specifications of the model:

$$PRCR_{it} = prob\ (Y_{it}=1) = \frac{1}{1+(e^{-zit})} \qquad (4.2)$$

$$Z_{it}=\beta_0+\beta 1(Log)NPL/GA^{\wedge}_t+\beta_2(SETA)_{it-1}+\beta_3(RETA)_{it-1}+\beta_4(WCTA)_{it-1}+\beta_5(NI)_{it-1} \qquad (4.3)$$

Where

Z_{it} = *log odd function*

$X_{j,it}$ = *Financial characteristic j of bank i*

Y_{it} = *is assigned value of 1 if the net income remains negative for consecutive two years, otherwise 0*

Estimated NPL to Gross advance ratio completely incorporates bank's sensitivity to financial inclusion factors as well as micro effects.

For estimation, NPL/Gross advance ratio is regressed on financial inclusion determinants of the supply side to obtain γ factors in the form of $\gamma_{ADV\ MFI}$, $\gamma_{ADV\ PLFINC\ TOT}$, $\gamma_{ADV\ SOA}$, $\gamma_{DOUT\ POP}$, γ_{EBNKTR}

The model essentially depicts the *"Volume of financial inclusion"* & its effects upon credit risk of the banks as nearly all financial Inclusion determinants of the supply side are given by *"Amount in Millions".*

$$(Log)NPL/GA_t = \gamma_0 + \gamma_1(\text{ADV MFI}_{\text{AMOUNT}})_{t-1} + \gamma_2(\text{ADV PL}_{\text{FINC}}\ \text{TOT}_{\text{AMOUNT}})_{t-1} + \gamma_3(\text{ADV SOA}_{\text{AMOUNT}})_{t-1} + \gamma_4(\text{DOUT}_{\text{POP}})_{t-1} + \gamma_5(\text{E-BANK TR}_{\text{AMOUNT}})_{t-1} + e_{it} \qquad (4.4)$$

After attaining $INFEC^{\wedge}$ (estimated), Z_{it} equation (4.3) is calculated.

The Indirect model uses estimated NPL to Gross advance ratio calculated from estimated changes in financial Inclusion determinants, eq. (4.4) and banks sensitivities to those financial Inclusion variables, eq.(4.3) as proxies of financial Inclusion factors. The estimated NPL to Gross advance

ratio of 48 banks of banking sector of Pakistan along with micro specific variables of all banks are used to find the credit risk level of banking sector.

3.3.4 Credit Risk & Quantitative Frequency of Fin Inclusion-The Indirect Approach Model

In this model, we devise the specification to analyze the "financial inclusion quantitative frequency" & its impact on Banking sector credit risk. To estimate infection ratio, NPL to Gross Advances ratio is modeled through financial inclusion determinants of the supply side as mentioned previously to obtain γ factors in the form of $\gamma_{SINC\ UP\ MKT}$, $\gamma_{ADV\ ROM}$, $\gamma_{ADV\ SOA}$, $\gamma_{DOUT\ POP}$, γ_{ATM}.. The model essentially depicts the *"Quantitative frequency of Financial Inclusion"* & its impact on credit risk of the banks as nearly all financial Inclusion determinants of the supply side are represented by *"# of Accounts"*.

$$NPL/GA_t = \gamma_0 + \gamma_1 (S_{INC\ UP\ MKT_{\#\ OF\ ACCOUNTS}})_{t-1} + \gamma_2 (ADV\ PER\ SOA_{ACCOUNTS})_{t-1} + \gamma_3 (ADV\ ROM_{ACCOUNT})_{t-1} + \gamma_4 (DOUT_{POP})_{t-1} + \gamma_5 (ATM_{\#})_{t-1} + e_{it}$$

$$Z_{it} = \beta_0 + \beta_1 NPL^{\wedge}/GA_t + \beta_2 (SETA)_{it-1} + \beta_3 (RETA)_{it-1} + \beta_4 (WCTA)_{it-1} + \beta_5 (NI)_{it-1} + \mu_{it}$$

$$PRCR_{it} = prob\ (Y_{it}=1) = \frac{1}{1+(e^{-zit})}$$

3.4 DATA

We use panel data for the study, the sample frame considered is from 2001-2017. Forty-Eight (48) banks representing Pakistan's entire Banking industry comprise the sample, constituting of, scheduled commercial banks, public sector banks, specialized banks and foreign banks. All mergers/ acquisitions[3] are accounted for in the study. For Financial Inclusion determinants (supply side), data from Dec 2001 – Dec 2017 is used, sources being annual data of Statistics on Scheduled Banks in Pakistan (SBP), State Bank of Pakistan; Statistical Hand Book (Pak Economy) &

[3] Refer to Annexure I for mergers and acquisition detail over the period

Statistical Publications. For CAMEL category variables & individual banks data, the data of State Bank of Pakistan is used. Financial Statement Analysis (FSA) comprising of balance sheets of every bank spanning over a period of 17 years.

3.4.1 VARIABLE CONSTRUCTION

Financial inclusion-supply side is a multi-dimensional phenomenon and cannot be captured by a single indicator, rather established by number of determinants. Literature shows the employment of various indicators of supply side data at country level for determining the access to financial services. The basic indicators used are ATMs/100,000 adults, ATM/1,000 km^2, commercial bank branches/100,000 adults and commercial bank branches /1,000 km^2. These indicators depict the "physical services point" by financial service providers (scheduled banks, rural and agri. banks, saving banks, saving and credit cooperation's, microfinance institutions and money market funds). Certain cross-country studies used the variables of land mass, adult population along with geographic outreach and demographic outreach concerning supply of financial services and products. The findings of these studies suggested that population indicators contain more information in explaining the access dimension of supply side of financial inclusion to geographic (area) indicators.

Another variable of "attaining a loan" also depicts a rather consolidated stage of financial inclusion as it belongs to that level in hierarchy of availing financial services where such individuals already have utilized other form of financial products such as bank account, pay roll accounts etc.

"Attaining a loan can be a precise measure to ascertain more advance levels of fin. Inclusion" (Camara and Tuesta 2014). Literature also shows that efficiency of the financial system is another variable that determines the supply side financial inclusion level. Financial system efficiency minimizes the barrier of affordability of the financial services (formal) as efficient financial

systems provide services at a competitive price. Further the supply side of financial inclusion is not only dependent upon characteristic financial market concerns like financial institutions efficiency and stability but also upon wider subjects beyond financial market like governance, macro factors like GDP, inflation and net interest margin. Financial inclusion highly correlated with net interest margin as shown by the study of Allen et al. (2013) where higher correlation was found upon regressing adults with account's percentage and Gross domestic product per capita. The result showed higher R^2 of OLS regression of penetration of accounts on log of Gross domestic product per capita

3.4.2 Construction of financial Inclusion determinants of supply side

The selection of financial Inclusion-supply side determinants is through Thiel's criterion; by drawing out a smaller set of variables. The elimination procedure shortlists multiple variables.

The variable construction is given in the table as follows:

TABLE 3.4.2: Construction of Financial Inclusion Variables

FINANCIAL INCLUSION DETERMINANTS -SUPPLY SIDE		
DIMENSION OF ACCESS –SUPPLY SIDE		
VARIABLES	**CONSTRUCTION**	**SOURCE**
DEMOGRAPHIC OUT REACH BANK BRANCHES/100,000 ADULTS	Out Reach by Population **$DOUT_{POP}$** (#)	12. Distribution of Offices of Several Classes of Scheduled Banks by Population, Part1-XII, Banking Statistics of Pakistan, Annual, Statistical Publication, All Banks (2000-2017)
AUTOMATED TELLER MACHINES	Automated Teller Machines **$ATM_{\#}$**	4.26 Electronic Banking Statistics, 4. Money & Banking, Handbook of Statistics on Pakistan Economy (2003-2017)
ELECTRONIC BANKING AMOUNT OF E-TRANSACTIONS	**$E\text{-}BANK\ TR_{AMOUNT}$** **$E\text{-}BANK\ TR_{\#\ of\ TRANS}$** (Million Rs) Comprising of 6 types of transactions (internet, ATM, POS, RTOB, mobile, call center)	14. Telegraphic Transfers Issued and Encashed by the State Bank of Pakistan, Part-1, Banking Statistics of Pakistan, Annual, (2001-2004) (Issued value) 4.26 Electronic Banking Statistics, 4. Money & Banking, E-Banking Financial Transactions Handbook of Statistics on Pak Economy (2004-2017) Dec value

BANKING VARIABLES – SUPPLY SIDE		
ADVANCES PERSONAL OF FIN$_{INC}$ TOT (A+B+C) (Amount) **D. CREDIT CARDS** (Amount & # of Accounts) **E. CONSUMER DURABLE** (Amount & # of Accounts) **F. PERSONAL LOANS** (Amount & # of Accounts)	As per literature these advances are disbursed to individuals & are financially inclusive in nature **ADV PL$_{FINC\ TOT AMOUNT}$** **ADV PL$_{FINC\ TOT ACCOUNT}$** **ADV CC$_{AMOUNT}$** **ADV CC$_{\#\ OF\ ACCOUNTS}$** (Million Rs) **ADV CD$_{AMOUNT}$** **ADV CD$_{\#\ OF\ ACCOUNTS}$** **ADV PL$_{AMOUNT}$** **ADV PL $_{\#\ OF\ ACCOUNTS}$**	4.15 Classification of Scheduled Banks' Advances by Major Economic Groups 2000 onwards, All banks only & amount only
ADVANCES MICRO FIN INSTITUTIONS (Amount)	Advances disbursed to Microfinance Institutions which in turn facilitate financial Inclusion **ADV MFI$_{AMOUNT}$** (Million Rs)	4.15 Classification of Scheduled Banks' Advances by Major Economic Groups 2001 onwards, All banks only & amount B-III-(ii) (Development Fin. Institution proxy) 2001-2005 B-III-(D) (Microfinance) 2006-2015 All Dec value
ADVANCES FInc BY SIZE OF ACCOUNT (TOT) (Amount & # of Accounts)	Low sized advances identified against the full range of size of accounts from <5k – 10 mill & above. The threshold selected for financial Inclusion advances is size of accounts from <5k – 1Mill. (Million Rs) **ADV SOA TOT$_{AMOUNT}$** **ADV SOA TOT$_{\#\ OF\ ACCOUNTS}$**	6. Classification of Scheduled Banks' Advances by Size of Account Banking Statistics of Pak (SBP) 2000 0nwards for all banks (Dec value)
NPL TOTAL(> 90 Days) **INFECTION RATIO**	Total Non-Performing Loans **NPL$_{TOT}$** (Million Rs) NPL/GROSS ADVANCES **INF$_{RATIO}$** **(percent)**	4.22 Non-Performing Loans, 4-Money & Banking, All Banks (2001- 2017) Handbook of Statistics on Pakistan Economy
ADVANCES BY RATE OF MARGIN (Amount & # of Accounts)	Low cost accounts identified against the full range of Rate of Margin, 0 – 99.99. First half of total range selected for financial Inclusion accounts comprising of rate of return range of 0 – 50.00. **ADV ROM$_{AMOUNT}$** **ADV ROM$_{ACCOUNT}$** (Million Rs)	3.7 Advances Classified by Rate of Margin .All Banks, **Amount** & **# of Accounts** (2000-2017) Statistics on Scheduled Banks in Pak (SBP)
SUPER INCLUSION UP MARKET **C. SUPER INCLUSION UP MARKET(Total Adv)** AMOUNT BY ALL BANKS NO. OF ACCOUNTS BY ALL BANKS	**S$_{INC\ UP\ MKT AMOUNT}$** (Million Rs) **S$_{INC\ UP\ MKT\ \#\ OF\ ACCOUNTS}$** **A measure for voluntary exclusion barrier of "lack of access to financial services"** A total of All amount & # of accounts of **Total Advances** above the threshold of Rs. 1 million as bigger loans belong to up market causing super inclusion of rich & advantaged segments of society	6. Classification of Scheduled Banks' Advances by Size of Account Banking Statistics of Pak (SBP) 2000 onwards for all banks (Dec value)

3.4.3 Construction of Bank Specific Variables

NI (Net Income)

$(NI_t - NI_{t-1})/(|NI_t| + |NI_{t-1}|)$ Where NI_t and NI_{t-1} refer to current year & prior year net incomes.

NI = Net profit - Tax provision.

GADV (Gross Advances)

Gross Advances reflects the growth rate of gross advances.

INTWO: Dummy variable, having value of 1 if the net income remains negative for consecutive last two years, otherwise 0.

C.A.M.E.L

The literature of Finance and accounting illustrates a very sound evidence of researchers using CAMEL category variables for estimating credit risk and financial default models. In the tradition of Salchenberger et al. (1992), the CAMEL framework is as follows:

1.	Capital	*SETA (Shareholder Equity/Total Asset Ratio)
2.	Assets	*RETA (Retained Earnings/Total Asset Ratio)
3.	Management and Earnings	*ONIS (Operating Income to Net Sales Ratio)
4.	Liquidity	*WCTA (Working Capital/Total Asset Ratio)

* CAMEL category is given by right column whose construction is explained in the Annex II.

TABLE 3.4.3: Construction of Bank Specific Variables

***SETA** Shareholder's equity to total assets, also called shareholder's equity ratio. It quantifies the assets on which stock-holders have a claim and defines the amount that stockholders will get if liquidation of firm takes place.

***RETA** Retained earnings to total assets ratio represents the quantity retained in the business, also termed as self-financing ratio.

Retained earnings = reserve accounts + un-appropriated/retained profits

For RETA, firm's age is implicitly considered as this ratio gauges accumulative Profitability over the period of time. It is worth mentioning that this ratio exhibits biasness as it is inclined towards classifying young firms as distressed, as firms require Time to attain a level of cumulative profits.

***WCTA** Working capital to total asset ratio. This ratio measures firm's net liquid assets relative to total capitalization.

Working Capital = Current Assets – Current liabilities

Working capital to total assets ratio is considered as the best indicators of financial distress. The literature shows an extensive use of this ratio in predicting bankruptcy models e.g. Altman (1968); Triapat and Nittayagasetwat (1999) and depicts the significance both in uni-variate and multivariate models.

Operating income to net sales. As,

Operating Income = Gross profit – Operating expenses

ONIS = (Gross Profit) – (Operating Expenses)/(Sales)

*__OINS__ Operating income considers both COGS (cost of goods sold) and fixed expenses. *Interest and taxes are not deducted from net operating income.*

Also called as operating margin it's a measure of firm's operational efficiency, intra-industrial efficiency & pricing strategy.

Net sales refer to the total amount of sales business makes after allowing for deductions for damaged products, returns and discounts

Also called as operating margin it's a measure of firm's operational efficiency, intra-industrial efficiency & pricing strategy.

3.5 EMPERICAL RESULTS

This section explains the risk assessment of the vital Banking Sector of Pakistan via estimated results comprising of a sample of 48 banks, covering a period of 2001 to 2017.

3.5.1 Credit Risk & Volume of Financial Inclusion- The Indirect Approach Model

The results obtained for probability of credit risk; indirect specification model signify that majority of the financial inclusion determinants are greatly significant in defining the level of risk. ADV_{MFI}, ADV_{SOA} & DOUT exhibiting a negative relation where increase in these advances' portfolios, lowers the probability of Credit risk; whereas $ADV_{PL\ FINC}$ & E_{BNKTR} show positive relationship with infection ratio, showing the potential of credit risk to increase with demographic out reach of banks & increase in financially inclusive advances. While, bank micro variables SETA, RETA & NI are significant at 1 percent; concurring with findings of literature, where greater the ratios, the lower the probability of credit risk (Tirapat and Nittayaga Setwat, 1999). A unit rise in RETA, WCTA and NI decreases the probability of Credit risk whereas a unit increase in SETA brings an increase in the risk level.

TABLE 3.5.1: Credit Risk & Volume of Financial Inclusion- The Indirect Approach Model

INTWO Explanatory Variable	Estimate of Co-efficient
	Y Direct
Constant(C)	0.020073 (0.004151)
D(NPLGA) ESTR	-.1286751 **(dy/dx)** (.1473259)
Financial Inclusion Characteristics	
1. $\gamma_{DLOG(ADV\ MFI)}$	-0.002363 (0.001791)
2. $\gamma_{DLOG(ADV\ PL\ FIN)}$	0.150181 (0.028836)***
3. $\gamma_{DLOG(ADV\ SOA)}$	-0.456612 (0.04678)***
4. $\gamma_{DLOG(DOUT)}$	-0.034654 (0.012367)**
5. $\gamma_{DLOG(EBANKTR)}$	0.003316 (0.004342)
Bank Specific Characteristics	**Average Marginal Effects (dy/dx)**
1. SETA	0.2992767 (.0936144)***
2. RETA	-0.3001731 (.0965945)***
3. WCTA	-0.1520542 .0934049
4. NI	-3.63e-08 (7.09e-09)***

Note: *For Indirect model, Prob* $(Y_i = 1) = \frac{1}{1+(e^{-zit})}$ *, where* $Z_i = a + bDNPLGA + \sum_j c_j X_{j,i}$. ***DNPLGA****$_{EST}$ is the estimated infection ratio of the Banking sector.* $\gamma_{ADV\ MFI}$ *represents the sensitivity of banks to the changes in advances to MFI.* $\gamma_{ADV\ PL\ FIN}$ *represents the sensitivity of banks to the changes in financially inclusive advances.*$\gamma_{ADV\ SOA}$ *represents the sensitivity of banks to the changes in low sized accounts.* γ_{DOUT} *represents the sensitivity of a banks to the changes in demographic outreach.* $\gamma_{EBANKTR}$ *represents the sensitivity of banks to the changes in electronic banking transactions.* ***SETA*** *presents ratio of stockholders' equity to total assets of the bank.* ***RETA*** *presents ratio of retained earnings to total assets.* ***WCTA*** *presents ratio of working capital to total assets.* ***NI*** *presents net income of the bank. In the logit model the dummy variable used is* ***INTWO*** *(1 if net income is negative for consecutive two years,0 otherwise) Parentheses include the standard errors in ( )***, **, and * denote statistical significance at 1percent,5percent & 10percent respectively.*

The result suggests that NPLs affects the risk, profitability and performance when inspected in the connotation of dependent variable INTWO (net income negative for consecutive 2 years) and OENEG (Total liabilities > Total Assets)

Concerning the supply side-factors, for banking sector, the systematic risk of the banks exposed to these factors affects the probability of bank's credit risk. The co-efficient of ADV_{MFI} with negative sign infer that a unit rise in the ADV_{MFI} decreases the level of credit risk by .002percent. The negative relationship can be explained in a manner where impact of a unit increase in Advances to MFI translates itself in a higher denominator of gross advances but not increasing the numerator of NPL of infection ratio, thus reducing the ratio (NPL/GA) on the whole. The relationship is also supported by literature as Kipesha and Zhang (2013) found that in developing countries, financial inclusion was primarily spearheaded by Micro finance Institutes and these MFI's depicted sound repayment capacity when loans were channelized to them by Government owned banks. Other studies also confirmed commercialization and price control absence inducing MFI's to charge worldwide, an average interest rate of 25-30 percent (CGAP Report, 2006), an aspect undermining the role of MFI for dismantling financial exclusion but confirming their status as a non-risky cliental of Banking sector.

Another, financial inclusion-supply side determinant with a negative relationship with infection ratio is $ADV_{SOA,}$ negative sign inferring that a unit rise in the ADV_{SOA} decreases the level of credit risk by 0.45percent. Advances by Size of Account is an important variable from both perspectives of financial Inclusion & Credit risk & in this study ADV_{SOA} represents low sized advances of <5k – 1Mill identified against the full range of size of accounts from <5k – 10 mill & above. Literature confirms this relationship, where, on one hand, the smaller softer loans promote financial Inclusion & on the other side since NPL's is a signal of credit risk. To resolve the issue,

banks try to decrease the loan sizes. Espinoza and Prasad (2010) showed that swelling the loan sizes creates a lagging impact on NPL's, making it harder for banks to timely handle the repercussions of credit risk. From bank-specific outlook, it is evident that creation of NPL is essentially affected by size of loans & management of bank (Guan et al. (2017).

$ADV_{PL\ FINC}$ exhibits positive relation with infection ratio showing that a unit rise in the ADV_{SOA} increases the level of credit risk by 0.15percent. In this study $ADV_{PL\ FINC}$ represents financially inclusive advances, considerably large portfolio by all banks, disbursed to individuals by the banks, classified as credit cards, consumer durable & personal loans. The effect of ADV_{SOA} is explainable through theoretical literature, Salas and Saurina (2002) showed evidence of substantial correlation of expansion of loans & banks size with NPL's of scheduled banks. Findings also concur with Han and Malecky (2013) who indicated that from financial inclusion demand side, greater number of people with greater bank deposits increases banks stable streams of funds & contributes to reduction in volatility of banks deposits during economic slumps, however from the perspective of supply side, if the inclusive expansion is towards uncredited-non worthy clients and targeting unfamiliar territories, then this poses a threat of potential rise in credit risk.

Demographic outreach by Banks (DOUT), a crucial determinant of dimension of access of financial Inclusion of supply side bears negative relation with infection ratio of the banking sector showing that a unit rise in the DOUT decreases the level of credit risk by 0.034percent. Demographic outreach by banks has been modeled earlier in empirical researches[4] & has shown mixed results. Gupte et al. (2012) employed cost, expansion, usage and financial transaction

[4] Musau, Muathe & Mwangi (2018) proxy the accessibility of banks by no. of bank accounts/100 persons & no. of bank branches/100 persons, where value of 0 implied no accessibility & value of 100 depicted perfect accessibility. The results showed, that for Kenya, accessibility quadrupled between 2007 & 2015, with 92 out of 100 people covered by commercial banks outreach, enabling Kenya to be 70percent financially inclusive with near perfect accessibility in terms of demographic outreach by banks (FSD report, Kenya 2016)

convenience for improving measures of financial inclusion. Salas and Saurina (2002) showed evidence of significant correlation of size of banks with NPL's of commercial banks. Chen, Feng & Wang (2018) confirmed that financial inclusion has negative relation with NPL's of banks while size of banking asset, inclusive of branch network has similar impact as well.

The micro specific variables for credit risk are the CAMEL characteristics of SETA, RETA, and along with NI turn out to be highly significant in the risk profiles, endorsing the impact of "Balance Sheet Channel" of the banks.

The (RETA) and (WCTA) exhibit negative relation with the Credit risk with a magnitude of -0.30percent and -0.15percent respectively, consistent with the findings of theoretical & empirical literature (Tirapat, Nittayaga and Setwat 1999) & (Chen, Roll and Ross 1986) where the relationship is such, where greater the ratio, the lower is the probability of credit risk as higher ratios are synonym with financial soundness & profitability. The very same relationship stands for shareholder equity to total asset ratio (SETA), however, surprisingly, for this study, SETA depicts a positive relation with Credit risk. However, digging deep in literature of CAMEL & financial health ratios, there exists a valid justification for this positive relation of SETA & credit risk which is understandable in the context of debt financing/owners' equity & profitability. As per results of numerous studies, there exists a positive link among the level of debts & Credit risk & positive relationship between higher levels of debts & profitability. However, if leveraging reaches a considerable level, inferring lower equity ratio, then there will be higher cost related to leveraging/owners capital. At these exceeding debt levels, debt then becomes negatively related to profitability. Same context applies to SETA, Salah & Fedhila (2012) found that equity levels & Credit risk are negatively related. Corcoran (2010) in his study put forth the same results. Hsieh and Lee (2010) discovered a negative relationship among equity and assets. The negative

relationship applies to the scenario when the firm or the bank is economically viable; "the value of what it owns exceeds the value of what it owes", therefore equity will be positive & negative association amongst credit risk and equity will hold. However, when the company is not viable, "the value of what it owes exceeds what it owns", Berríos, (2013) states the scenario as "While profitability of bank, on its own, does not essentially increases shareholder returns, continuous unprofitability will, at certain point in time, damage liquidity in a manner that reduces share values". Since dependent variable in this logit model is INTWO *(Dummy variable, value of 1 if net income remains negative for consecutive two years, otherwise 0)*, a measure of primary level of Credit risk, the scenario is of continued un-profitability where shareholders may withdraw well before return on equity decreases further due to loss & increasing potential Credit risk. The negative sign of Net Income (NI) is comprehendible as any increase in NI is an explicit remedial measure of Credit risk as higher profitability reduces the Credit risk.

The results in Table 3.5.1 show for credit risk, R^2 of 0.9687 which suggests that financial inclusion determinants have descriptive power as it explains 96.8 percent of banks credit risk in Pakistan. Thus, financial inclusion can sufficiently account for deviation in stability of banking sector in Pakistan.

3.6.1 Credit Risk & Quantitative Frequency of Fin Inclusion-The Indirect Approach Model

The results obtained for probability of credit risk; indirect specification model signify that all the determinants of financial inclusion are significant in defining level of risk except for ADV SOAAC. DLOG ADV $_{\textbf{SUPERINLUSION}(-1)}$ is significant at 5 percent and displays positive association whereas DLOG $ADV_{ROMTAC(-2)}$ is significant at 5 percent exhibiting positive relation where increase in ADV_{ROMTAC} raises the probability of Credit risk whereas DATM(-1) shows negative relation. DLOG ADV $_{\textbf{SUPERINLUSION}(-1)}$, the total *number of Advances* above the threshold of Rs. 1

million to 10 billion, representing the bigger loans belonging to up market causing super inclusion of advantaged segments of society shows positive relationship with infection ratio; showing the potential of credit risk to increase with increase in advances for the up market. The literature shows how bigger loans are risky & banks tend to reduce the size of loans to avoid Credit risk.

Advances by Rate of Margin (DLOG $ADV_{ROMTAC(-2)}$) are the *number of low cost accounts,* comprising of rate of return range of 0 – 50.00, identified against the full range of Rate of Margin, 0 – 99.99; exhibits positive relation where increase in these accounts increases the probability of Credit risk. Multiple studies suggest that "no-frill" accounts promote a threat to the banks in the context of credit risk. While the Demographic outreach by banks DOUT exhibits negative effect on credit risk in quantitative model. We also model ATM & Low sized accounts termed as DLOG (ADV_{SOAAC} (-1)) which exhibits negative relation.

The bank micro variables SETA, RETA, & NI are significant at 1, 5 and 1percent respectively; concurring with findings of literature, where greater the ratios, the lower the probability of credit risk (Tirapat and Nittayaga Setwat, 1999). A unit rise in RETA, WCTA and NI decreases the probability of Credit risk whereas a unit increase in SETA brings an increase in the risk level which has been discussed at length in the earlier model of volume of financial inclusion.

The estimated NPL to gross advances ratio is significant at 5percent, with a positive coefficient, implying that a higher Non-Performing Loan to Gross Advances ratio increases the probability of credit risk. The results suggest that NPLs affects the risk, profitability and performance when inspected in the connotation of dependent variable INTWO (net income negative for consecutive last two years)

TABLE 3.6.1: Credit Risk & Quantitative Frequency of Fin Inclusion-

INTWO Explanatory Variable	Estimate of Co-efficient
	Y Direct
Constant(C)	-0.017695 (0.030531)
NPLGAEST	0.5707244 **(dy/dx)** (.2699158)**
Financial Inclusion Characteristics	
1. $\gamma_{DLOG(SUPERINLUSION(-1))}$	0.064721 (0.021521)**
2. $\gamma_{DLOG(ADVSOAAC(-1))}$	-0.010671 (0.048271)
3. $\gamma_{DLOG(ADVROMTAC(-2))}$	0.169672 (0.06159)**
4. $\gamma_{D(ATM(-1))}$	-3.06E-05 (1.13E-05)**
5. $\gamma_{D(OUT(-1))}$	-0.000284 (7.59E-05)***
6. $\gamma_{NPLGA(-1)}$	1.907112 (0.380165)***
7. $\gamma_{NPLGA(-2)}$	-0.921182 (0.240950)***
Bank Specific Characteristics	**Average Marginal Effects (dy/dx)**
1. SETA	.2409567 (.0927952)***
2. RETA	-.2317715 (.0961611)**
3. WCTA	-.0984638 .0946811
4. NI	-3.77e-08 (6.94e-09)***

Note: *For Indirect model, Prob ($Y_i = 1$)= $\frac{1}{1+(e^{-zit})}$, where $Z_i = a + bNPLGA + \sum_j c_j X_{j,i}$.* ***NPLGA**$_{EST}$ is the estimated infection ratio of the Banking sector.* $\gamma_{SUPERINLUSION(-1)}$ *represents the sensitivity of banks to the changes in advances to up market.* $\gamma_{ADVROMTAC}$ *represents the sensitivity of banks to the changes in advances by rate of margin.* γ_{DOUT} *represents the sensitivity of a banks to the changes in demographic outreach.* ***SETA*** *presents ratio of stockholders' equity to total assets of the bank.* ***RETA*** *presents ratio of retained earnings to total assets.* ***WCTA*** *presents ratio of working capital to total assets.* ***NI*** *presents net income of the bank. In logit model the dummy variable used is* ***INTWO*** *(1 if net income is negative for consecutive two years, 0 otherwise). Parentheses include the standard errors in ( ).***, **, and * denote statistical significance at 1percent,5percent & 10percent respectively.*

3.6 CONCLUSION

The *third essay* of the study performed a broad based assessment of *Credit Risk & financial inclusion nexus* by using a panel of 48 banks of Banking sector of Pakistan, employing approx. 1,000 balance sheets over period of 2001 to 2017; evaluated whether credit risk of banking sector increases or decreases due to financial inclusion; whether financial Inclusion is less risky-sound investment or high risk-bad investment for banking sector of Pakistan.. Using logit discriminant analysis, this study developed a multifactor model which presents the relationship between the NPL's; a measure for credit risk of banks and bank's sensitivity to financial Inclusion determinants of supply side.

The study indicates that NPL are highly affected by financial inclusion determinants of supply side and micro characteristics. The study put forth a strong evidence that Pakistan’s banking sector displays considerable credit risk due to greater probability where relationship of financial inclusion with credit risk is negative in nature.

The model is useful in providing warning signals of any upcoming crises as it highlights the determinants and magnitude of risk; so that protective measure can be sought for immunizing the economy and protect it from contagious, potentially lethal financial diseases.

Digital Lending & Fin-Tech Evolution

"Rethinking Financial Inclusion from An Evidence based Perspective for Pakistan"

4.1.1 INTRODUCTION

Emerging Digital Lending

There is a phenomenal shift in the market for lending across the globe. A new creed of digital lenders has emerged on the horizon who are focusing on emerging market and competing for conventionally underserved and down market cliental. These lenders are penetrating into highly digitized customer data, developing advance analytics, machine learning and cost-effective digital channels to design and deliver digital services and products to global clientele.

The market opportunity is huge, *alternative finance* have become a US $145 billion industry growing at a rate of 264percent annually (KPMG 2016 report). Digital lending is crucial for the global initiative of creating a financially inclusive world and uplifting three billion financially excluded people by providing them the formal financial services which will foster greater economic and social development.

The advantages of adopting digital lending are multi-faced, in the shape of reduced operating expenses, quicker turnaround time, reduced delinquency out of better decisions making, better understanding of client behavior and greater customer engagement due to customized products. However, adopting a digital lending model comes with challenges and risks. Digital lenders have to struggle with changes that need to be incorporated for risk management and efforts for the collection of loans. On the other side digital lending can have un-anticipated effects on the client, resulting in the form of misunderstanding, over indebting and in extreme cases, financial exclusion. Thus, FSP's need to design product appropriately keeping these risks in mind.

4.1.2. SIGNIFICANCE OF THE STUDY

Globally, nearly half of the population of the world lack access to formal accounts and financial services. Pakistan's case in no exception and lies at the lower spectrum of financial inclusion. Nonetheless, initiatives are taken by government, regulator and private sector to increase financial services access of credits, insurance, savings and remittances. Pakistan is an evolving market for digital lending and fin-techs with enhanced assistance for digital transactions, extensive penetration of smart phone and internet, consumer inclination for social/digital media and growing e-commerce platform.

Digital solutions and mobile banking which constitutes over the counter (OTC) transactions and mobile wallets, is growing rapidly, globally and possesses the potential to decrease barriers to Financial Inclusion. Even more pronounced advantages of these platform are for economies with a fragile financial architecture and where commercial banking involves substantial costs in terms of distance and time.

This study offers an *Evidence-Based-Way-Forward Approach* for digital financial inclusion in Pakistan by providing an extensive overview of digital lending & Fin-tech eco-system of Pakistan; performs a qualitative *SWOT analysis of demographic, economic, branchless banking & technological landscape,* favorable for the growth and penetration of fin-tech in Pakistan. We define the *Digital Maturity Matrix* for Pakistan inclusive of *Tech & Touch Spectrum* of existing Fin-Techs of Pakistan with the help of cutting-edge literature by *Accion Insights*[5]. It also taps upon the environment that is required to be constructed for Pakistan to exploit the full potential.

4.2. LITRATURE REVIEW

4.2.1 Principal Components of Digital Lending

[5] The literature review of this essay is primarily based on the research papers by *Accion Insights*, essentially mentioned & cited by the title of the articles in references section.

Digital lenders deploy digital channels like USSD (Un-structured supplementary service data) & smart phone apps to tap existing and new cliental. Whereas they are and whenever they want so that they can apply for loan, receive disbursement and information about their accounts and can make repayments remotely.

Contrary to face to face, time consuming evaluation, digital lenders are dependent upon digitized data for evaluating clients. Multiple data sources like bill payment histories, bank statements, e-commerce transactions, credit bureau data and mobile data records are punched into algorithms and then analyzed to predict "capacity" and "willingness" to repay. Customer data is also used for improving customer experience and building engagement tactics; - for example by offering customized product or personalized communications. Once these digital processes are in place, the credit decision can be made in hours.

From the perspective of a customer, digital lending mean how he experiences the digital product. Digital lenders use data and digital channels to offer convenient access, quick time approach, credible products and pricing and personalized communication.

4.2.2 Digital Lending Models

Online Lenders: They are the financial service providers (FSP's) who provide "end to end" digitized lending products either through website or mobile app. The Customer journey, comprising of customer onboarding, disbursement, collections and engagements are normally fully digital. The model is primarily based on quality of scoring and design in a manner where there is no requirement of face to face interaction or even calling to a call center.

P2P Lender: It is the digital platform that ensures the facilitation of digital credit between a number of borrowers and lenders. These platforms play a vital role in the relationship management of borrowers and lenders. P2P lenders take the responsibility of product design, scoring the borrower and may take up the collections and repayments. The platform takes a fee or a portion of

interest income when funding is provided by lender. While some P2P platforms overtake the non-payment risk and the loan; others make a "loan-reserve-fund" out of the fees taken at disbursement.

E-Commerce and Social Platforms: These are the digital platforms where the core business is not credit but leveraging strong brand, digital distribution and rich customer data for the purpose of offering credit to potential borrowers of their customer base. These platforms are diverse in nature where some only act as origination platform for third party lenders which others offering end-to-end digital products, including funding. In these platforms, the customer continues to repay out of the pressure or desire to continue using the primary services of the platform. Poor repayment profile becomes part of customer record and causes exclusions from the platform.

Marketplace Platforms: These are the digital platforms that link many lenders to one borrower. Lenders see the market place platforms as acquisition channels, while for borrowers it seems as a source for accessing multiple lending products at competitive rates. Number of market place platforms offer credit risk assessment based on non-traditional data while lenders are in control of product design and provision of funding. These platforms charge origination fee upon disbursement of funds.

Supply Chain Lenders: They provide non-cash/digital loans for invoice financing and particular assets or "pay-as-you-go" asset purchase within a network of supply chain. These firm normally partner with key players within the supply chain network for acquiring customer and offer "closed-loop" lending products. The pressure of customer repayment is built by the penalties levied by the distribution network like the distributor can withhold stock/Inventory till payment.

Mobile Money Lenders: These are the partnership models where lenders align with MNO's (Mobile Network Operator) and offer loans through mobile money to customer base. The customers are acquired by lenders from MNO's network and mobile phone data is used for scoring

and disbursement to mobile wallet. This platform also incorporates the tech and touch balance where the digital interaction is complemented by physical network for cashing in and cashing out. Initially, the loan sizes are of smaller size but normally increase dramatically over time as second credit history builds with the lender.

Tech-Enabled Lenders: These are the traditional financial services providers who have digitized the lending process through partnership or in-house. The process includes digital acquisition, disbursement, repayment and management. The digital interface is also supported by a physical agency network for integrating tech and human touch.

Characteristics of Digital Lending Products

	Short Term-Small Loans	***Long Term-Larger Loans***
Product	• ***Consumer Loans*** • ***Nano Loans***	• ***Working Capital*** • ***MSME*** • ***Mortgages***
Credit Assessment	*Leveraged Upon "Willingness to pay"* ➢ *Behavioral assessment*	*Leveraged upon "Capacity to Pay"* ➢ *Documentary assessment* ➢ *Income estimation*
Additional Data Sources	➢ *Mobile Data &* ➢ *Alternate Data for assessing* ➢ *Client behavior* ➢ *Bureau data*	*"Digital foot print" of clients monthly/annual income, expenses, tax returns*
Non-Payment Penalty	➢ *No additional loans from FSP* ➢ *Black listing on bureau*	*Losing the pledged collateral/ inventory by the borrower* ➢ *Black listing on bureau*
Implications of digital lenders	*The customer engagement must be continuous and supportive throughout the repayment period for encouraging in time repayment* ➢ *The FSP can go into litigation for NPL's exceeding 60-90 days.*	*An upfront thorough assessment of client "capacity to pay" is essential* ➢ *The FSP can go into litigation process for NPL's exceeding 60-90 days.*
Implications for Customer	*Normally a complete digital experience where engagement is via mobile channels like mobile apps, website and SMS.* ➢ *The client needs to provide access to personal data for credit assessment.*	*The customer journey of acquisition, disbursement, repayment is fully digital, however the process may include physical checks and human touch.* ➢ *Access hurdle for those lacking data*

Source: Accion Insights

4.2.3 The Digital Lending Mechanism

The literature defines the "Lending Process" as Sequence of activities a FSP (financial service provider) perform to provide credit-from acquiring and on boarding a customer, to evaluating the customer and disbursing the loan, to receiving repayments and following up on the past due loans. (Accion Global Advisory), a "conventional lending process" transition to digital lending process occurs when the above-mentioned sequence of activities become purely or partially digitized one where the digital interface is supplemented by physical touch.

Customer On-boarding: The first and the foremost activity of a digital lending business model is "customer acquisition" which is done by a strategic mix of digital marketing tools, digital on boarding channels and physical touch. Digital marketing tools comprise of social media and advertising campaigns, SMS blasts, online applications and mobile platforms. The digital lenders can also establish remote on boarding through centralized call centers with agents or artificial intelligent powered chat bots.

An integral aspect of acquisition is "Customer Identification" which is done by making use of innovative methods in digital identity and electronic-know your customer (e-KYC) regulation for accessing public and private sector record/data. This digital data develops the basis of customer assessment and provides the opportunity for offering customized products. This customer acquisition can be a "direct acquisition" which is difficult and expensive but enables the lender to have direct access to customer and full ownership of the customer data. Another type of customer acquisition is when digital lenders collaborate with "data-rich" third party like e-commerce platform to leverage their cliental database. This type also requires strategic planning for a profitable partnership.

Approval and Credit Analysis: At the core of digital lending process lies the analytics and approval. Digital financiers use conventional information sources, alternate data source, advanced algorithms and analytics to assess and score potential customer. Lenders use independent bureau data along with other available data like call records, mobile money payments, e-commerce payment and social media information for better understanding and assessment of "this-file" customers. Data fed algorithms are used for predicting the willingness to repay for short term-large value loans. The advance algorithms are based on re-iterative machine learning techniques to improve turnaround time and risk analysis over time.

Disbursement and Repayments: The disbursement and repayment, are done by digital lenders via digital networks like e-commerce accounts, mobile wallets or bank accounts. These cashless channels offer more operational efficiency, reduced fraud levels and a traceable money trail.

Collections: Digital lenders use data and algorithms for collection process. Digital lenders also use "Delinquency Score Cards" for tracking customer behavior and developing customized recollection strategies. Delinquent customers face blacklisting and loose the consideration and access to future credit. Collections can also be done by partnerships in the form of third-party collections for later stage collections, POS transactions.

Cliental Engagement: The customer engagement process involves both out bound-lenders to customer and management. This communication from digital lenders is customized in the form of reminders, product offers based on customer type and behavior which enables customers to understand and manage their accounts, report complaints, ask questions. The customer engagement channels range from SMS, interactive voice response systems (IVR), call centers, self-service web portals, mobile application and chat bots.

4.2.4 Digital Maturity Paradigm

Financial service providers operate at different stages of digital maturity based on their existing activities, processes, market conditions and strategic goals. Literature identifies 3 stages of digital maturity.

Premature Digital: In early premature digital Customer acquisition is purely manual at Pre-Early stage digital but lenders are at a Pre-digital readiness stage of developing digital tools and channels like digital field application (DFA) & cloud-based core banking system. No use of score cards or analytics. The credit decision making is based on proof of income, expenses and sufficient cash flow.

Early Stage Digital: In early stage digital lending, financial services access and usage is enhanced by the provision of existing products and services through new channels. Digital channels are introduced for the multiple steps of the customer journey and early stage digital lenders enable customer to manage their accounts through digital channel along with significant physical support and interface with the clients through agents and loan officers.

Base Digital: At Base-Digital level, lenders cross over the "gateway" of access and offer customized and tailored financial products. At this stage, the credit decision making and delivery is data driven, supported by refined analytic.

Digital Plus: It is a fully-digital automated lending model for enhancing the usage of financial services. These lenders have sophisticated internal and external Bureau and alternative data basis that enables them to offer highly customized and personalized products.

4.2.5 The Tech & Touch Continuum

How to balance digital interactions and human touch to create inclusive financial systems.

1. ***Technology-Enabling Touch:*** In majority of instances, personal touch is essential for developing trust and familiarity in a product or service. In these scenario's fix-tech companies and digital lenders maintain face to face interaction with the customers, but also leverage technology to enhance in-person interactions e.g., tablets help field agents in enrolling clients for new products. Whats app group facilitate staff in answering customer queries and algorithms automate credit approval decisions. Customers don't require to understand or engage with technology, rather, technology enables the FSP to reach the cliental more effectively.

	Customer On-boarding	Approval & Credit Analysis	Digital Maturity Matrix Disbursement & Repayments	Collections	Clientele Engagement
PREMATURE DIGITAL	• Customer acquisition is purely manual at Pre-Early stage digital but lenders are at a Pre-digital readiness stage of developing digital tools and channels like digital field application (DFA) & cloud-based core banking system	• No use of score cards or analytics. The credit decision making is based on proof of income, expenses and sufficient cash flow which depict "willingness to pay" and "capacity to pay". However, the lenders are at a pre-deployment stage for adopting score card and analytics and acquiring standardized data sources for developing score cards	• The disbursement and repayments are cash based however lenders are in a process of developing mobile apps, accounts and mobile wallets for digital transactions. • Third party agent network and platforms are also being identified for partnering in future digital prospects.	• The delinquency work flow in nature with no use of data analysis, but core processes and activities that ultimately support the adoption of digital initiative in this segment are worked upon.	
EARLY STAGE DIGITAL	• Customer on boarding process is partially digital and inclusive of multiple manual steps throughout the acquisition process like manual KYC documentation. • Extensive use of existing physical network for promotion, visibility and interaction with the client.	• Rare use of advance analytics or score cards • Underwriting procedure dependent upon manual check for verification of information and scores. • The data sources for underwriting are primarily interval in nature, derived from interviews, applications form and site visits. • Credit decision making normally done by rule-based decision trees and gauging criteria.	• A strategic mix of digital and cash-based disbursement of funds and repayments. • Utilization of third party-existing agent networks for executing remote payments.	• Delinquency score cards and management is based on limited data analysis. • Development of manual and simple procedure for reminding customer of repayment.	• Customer is in a position to manage basic function of the accounts via digital channels like checking out loan balance, credit history etc. • Extensive use of existing physical network for problem solving of cliental and building trust.

	Customer boarding	Approval & Credit Analysis	Digital Maturity Matrix	Collections	Clientele Engagement
BASE DIGITAL	• Customer on-boarding process is mostly digitized where majority of acquired customer apply through digital channels e.g. internet, SMS, mobile apps etc. • Base digital level allows for physical interface if deemed essential due to regulations or cultural choices	• Use of basic analytic or basic score cards. • Underwriting process dependent upon minimal manual checks for verification of scores and information. • If available, additional exogenous data sources for underwriting are also used along with internal sources e.g. both standardized data (Credit Bear use) and alternative data (e-commerce) can also be utilized.	• Primarily digitized disbursement of funds and repayments through bank accounts or mobile wallets	• Delinquency network and management is data driven and uses basic analytics. • Delinquency score cards are developed with the help of basic internal data like repayment assessment and repayment time.	• Customer can manage major function of accounts via digital channels like editing account details, accessing documents. • Lenders to client communication is data driven and tailored as per client behavior with use of digital channels.
DIGITAL PLUS	• Customer acquisition process is fully digitized. • Digital plus level also allows for physical level of deemed necessary due to regulators or cultural preferences.	• Use of advance data drivers score cards inclusive of refined data analytics or machine learning. • Underwriting procedure fully-automated with limited physical and manual intervention for confirmation of information and scores. • Credit decision making done by the use of additional alternate data sources customized for particular customer segments.	• Essentially digitized disbursement of funds and repayments. Cash inflow and outflow managed through partner platforms who are exogenous in nature.	• Delinquency network and management is data driven and uses advance analytics like AI & chat bolts.	• Customer can manage all the functions of the account through digital channels. • The interaction with the lender (Out bound) is data driven and does not require physical interface and touch throughout the client life cycle.

Source: original source Accion Insights, refined by author by adding the "Premature Digital" in the context of Pakistan

2. ***Technology-Imitating Touch:*** In certain instances, customers are comfortable using technologies but still lack ease of doing business with FSP or not clear about product details. In imitating touch, digital lenders use technology-integrated approach, like SMS, emails, call center which offers some benefits as of face-to-face interactions but without relying on physical staff to resolve issues.
3. ***Technology-Replacing Touch:*** Also, in other instances, customers are comfortable with foregoing human touch and relying on technology. This scenario appears when customers feel fine interacting with technology and understand the product. Normally, this clientele is a regular user of smart phone and internet.

   In this contest, most importantly, it's not up to digital lenders to decide whether to "enable/initiate/replace" human touch during the customer journey, rather digital lenders and fin-tech must learn from their clientele base and determine the relevant spectrum.

   A recent study of Centre for Financial Inclusion (CFI) showed that potential clients across various demo-graphic segments-men, women, rural, urban, smart phone-regular phone users-have a preference for human interaction over technology at certain points in their customer's journey. There is no "One-size-fits-all" model for clientele preference but the fine tech startups and digital lenders should assess a balanced Tech & Touch spectrum when calibrating their business model for emphasizing upon technology or human interface.

- ***Product:*** The more the financial product is complicated or lesser the familiarity of customer with the product-the more will be the requirement of human touch e.g. customers are more familiar with saving accounts then insurance products.
- ***Labor and Technology Costs:*** Per unit cost of labor and technology or the tradeoff cost of both plays an essential role in defining the tech and touch balance as the firms have to ensure

profitability by the end of the day e.g., airtime charges are expensive in Zambia then Kenya, labor is much cheaper in India than Brazil.

- ***Customer and Market:*** Apart from differences in general "tech-services", in certain instances, preference for human interface can be deep rooted due to cultural, traditional norms that identify human interaction with trust, respect and credibility.

4.3 CRITICAL ANALYSIS

4.3.1 Evolution of Fin-Techs

Fintech firms delivers optimal financial solution to clientele by employing technology. The main goal of the Fintech is the digitization of the financial sector that results in cost reductions (Gregorio, 2017). Fintech primarily operate in the area of banking, asset management and insurance (KPMG UK, 2017). According to Gregorio (2017) Fintechs are operational in five extensive areas:

1) Finance & investment.
2) Payments and logistical infrastructure.
3) Risk management and internal finance operation.
4) Security and data monetization/analytics.
5) Customer engagements.

Fintech operations are most common and active in the sectors of payments, personal finance and funds transfer whereas, customers are less active in domains like insurance and wealth management.

4.3.2 Enablers of Fin-Tech Revolution

There are many factors behind the Fintech growth. Technology is at the heart of changing payments patterns and considerable industry transformation. Innovations like application

programming interfaces (API's) and cloud-based solutions are enabling the startups to run operations more efficiently.

***Mobile Devices**:* Mobile payments and banking; smartphone technology.

***Ecommerce**:* Transformation in digital payment experiences mainly tech savvy customers engage in online shopping, ease of user convenience speed.

Millennials: Who value innovation; are tech savvy and have greater adaptability for the latest technologies and automated gadgets which enable them to demand Fintech products. The demand for easy-to-use and personalized services and products by customers is a potential prospect for Fin-techs to develop well-tailored products as per need (Lei, 2014).

Cashless Payments: Cashless or digital payments are more secure and convenient for individuals for consumption (Japan-METI, 2017). The physical act of payment is rarely seen in developed economies as digital technology has become dominant (OECD, 2002).

Globalization & GFC: Contributed to rapid development in this sector; due to globalization innovations possible at a much faster rate than ever before.

It can be claimed that GFC play revolutionary role for the prominence of Fintech; unwillingness of banks to borrow money, this dis-functionality of credit market signaled and enabled Fintech to fill the void with reduced cost and reach out to underserved (Gregorio, 2017).

4.3.3 How Fin-Techs Influenced the World

1. ***Reduced Transaction Costs:*** Widespread mobile phone and internet have reduced the cost of transactions; novel communication technologies at cheaper rates.
2. ***Tailored Products and Services*** are much in line with the demands as compared to the products and services of conventional intermediaries. With improved work efficiencies and reduced intermediaries' role, Fin-techs are in a position to offer low-cost products and services

with increasing returns for customers (KPMG, UK 2017). This reduced transaction cost eventually puts pressure on traditional banking and other financial intermediaries, who compete to develop customized products as per consumer need (Bergara and Ponce, 2017).

3. ***Financial Inclusion of the Underserved Population:*** Fin-techs are actually the way forward for the poor & disadvantaged population of the society to be financially included. It is the answer to the most important question of how to proceed with the financial inclusion drive in the world of millennium. Kenya is one successful example of this concept.

4. ***Accessibility of Information:***

Fintech's increased information access concerning financial services like mobile/online banking and investment (Alexander, 2017). Further, digital payments allow business practices to improve and become transparent, enabling maintenance of expenses/sales record and monitoring of cash flow via digital platforms, thus boosting productivity and profitability (Manyika et al., 2016). Moreover, branchless banking reduces transaction cost which enhances eco-growth through network of employment creation, financial inclusion of underserved, better market function and poverty alleviation (Triki and Faye, 2013).

4.3.4 Fin-Tech Players in Pakistan

In Pakistan, number of firms, inclusive of some startups, offer Fintech application built for smart phones which are linked to bank accounts. The fin-tech industry implicitly existed in Pakistan for a long time in the shape of the firms who originally developed the ATM's (Automated Teller Machines), credit cards & debit cards for the banking sector. Currently, a new class of fin-tech is emerging in Pakistan with the goals to revolutionize & improve the financial inclusion landscape.

Easy Paisa: The e-payment platform of "Easy Paisa" is run by Telenor Pakistan and is already well established.

Alibaba & Alipay: The e-commerce giant of China, "Alibaba" runs "Alipay", a worldwide e-payment platform. "Ant Financial" is also owned by them, which has recently purchased 45percent ownership in Telenor, Micro Finance Bank.

Karandaaz Fintech Promotion: Another significant player in the financial inclusion landscape of Pakistan is Karandaaz. It is a non-profit organization setup by UK's department for International Development and Bill & Melinda Gates Foundation. Karandaz Pakistan is focusing upon 5 core areas for promoting Fintech startups; Financial services access; payments; digital savings; E-Commerce; Micro credit; Interoperability; early stage ideas of M-Wallet use cases; and Financial Services Education by using technology.

Abacus Consulting: Abacus Consulting is one of the leading finance related business solution provider in Pak. It offers services like management consulting and technology and outsourcing.

Autosoft Dynamics: It is a platform of software development responsible for developing financial applications for domestic and foreign banks.

Inov 8: A company for digital payments which has witnessed rapid growth in the region by partnering with easy paisa, it has linked its extensive network of distribution with every commercial bank who has implemented Inov 8's technology. It has also launched another application called "Fone Pay" under which payments can be made by using smart phones.

Monet: An e-payment platform with a focus on digitized payment in economies with liquidity preference. It offers e-payment flexible services and processing in the domains of branch-less and alternative channels of banking. It possesses its own system operating and infrastructure at Monet-Data Centers to facilitate banks, merchants and financial institutions in their payment transactions.

TPS: provides payment solutions and cards, facilitating banks, telecom and other organizations in digital payments. TPS also offers business expertise in mobile/internet banking, pre-paid cards, and management of delivery channels

***BATWA*:** It is a startup that offers mobile wallet services to its cliental for the transactions of payments.

FINJA: is not only a fintech startup that serves as financial platform for zero-cost payments but also plays the role of loan and e-commerce market place. The Sim-Sim app offers zero cost and frictionless payments instantaneously and is connected with the user's current account enabling them to make payments through their smartphones at various partnering retail businesses.

One Load: It is an online financial platform that enables its customers through its web portal to purchase top up credit for mobile accounts, across the board for all mobile companies.

Payload: It is a convenient platform that allows the businesses to conduct their transactions and receive payments in bit coin while dealing in Pakistani Rupee.

Red Buffer: It offers services related to data science, mobile and cloud applications and machine learning.

Stocksfm: This platform offers financial and investment services. Stockfm generates "STICKER" tags which enable its users to develop "Streams" of information across web and social media concerning stocks and markets. These streams provide information and ideas for managing financial investments (Tamoor, 2017).

Karlo Compare: a web and mobile application for purchasing and comparative analysis of a number of financial products like credit cards, travel insurance and personal loans etc.

4.4.1 SWOT Analysis of Digital Lending Landscape in Pakistan

(Strength: Weakness: Opportunity: Threats)

We perform a detailed SWOT Analysis of Digital Lending horizon of Pakistan by investigating the *Technological, Branchless Banking, Economic and Demographic* landscapes.

4.4.2 Technological Landscape

As per "Global Fintech Survey", penetration of mobile, data analytics, biometrics, infrastructure of cloud and cyber security are the most relevant and milestone technologies for the fin-tech investment and for embracing the *disruptive* types of fin-techs. The technological factors in Pakistan show all the right alignment (Rizvi et al. 2018).

The strengthening aspects of tech landscape are that there are 145 million plus NADRA-biometrically verified cell phones connections where approx. 48 mill uses 3G/4G/LTE connections with a remarkable cellular density of 71.4 percent. The massive number of verified SIMs stand as a great Tech-Enabler for issuing "mobile wallets" through click of a button (Yasir, 2018).

In terms of Digi-tech opportunities, the economy of Pakistan is relying highly on mobile technology with a mobile tele-density of 69percent. Smart phone adoption will rise to 51percent by 2020 from 16.6percent in 2016. Currently 59percent of smartphone owners perform at least one advance mobile function (Kanwal, 2017) while, the subscribers of mobile internet are anticipated to rise from 9million to 59 million in 2020, enabling Pakistan to become a country with fattest growth of mobile internet access rates (Rizvi et al. 2018).

The digital outreach depicts that 92 percent of land has cellular coverage facility network to previously disconnected remote areas (Rizvi et al. 2018) and Pakistan's e-tail is forecasted to grow to EVR 746 million by 2019 (Kanwal, 2017). The digital geographic outreach shows that currently there are 7.33 ATMs per 100,000 people in Pakistan. However, by-passing the physical

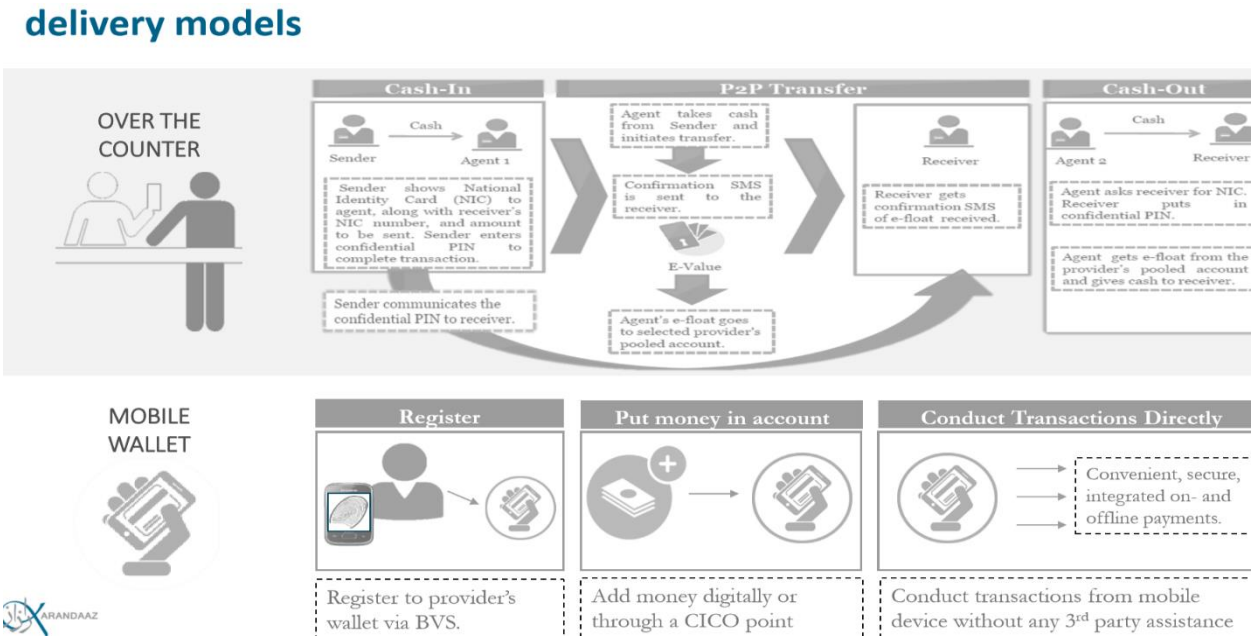
infrastructure, a jump to next generation eco-system of digital payment is possible as around 73% of Pakistan is considered urban or urbanizing, like insurance companies of Pakistan intend to reach customer via online channels along with digitally collecting premium payments (Kanwal, 2017). There are certain inherent weaknesses in the tech-landscape. Though biometric verification technology facilitated "Level-O" account opening; Sim verification drives geared up providers to initiate remote account – signups which resulted in large number of BVS accounts in 2015-2018 (Khan and Rashid, 2015) but in general the Bio-metric verification adoption remained sluggish and under targeted due to higher costs BVS machines. Nearly 38percent of mobile money agents required bio-metric machines or still not equipped, which can cause downturn in "OTC transactions" in the long run (Butt et al. 2017). Further, success in attaining interoperability, which greatly spurs mobile money use also remained limited in Pakistan. Interoperability is defined as "the possibility to transfer money between customer accounts at different mobile money schemes and between accounts at mobile money schemes and accounts at banks" [GSMA report on implementing mobile money interoperability 2013]. Providers offer "closed loops" mobile accounts which are restricted to client of particular mobile operator. In this context, interbank funds transfers (IBFT) via 1-link offers interoperability but it's not live yet on mobile wallets.

4.4.3 Branchless Banking Horizon

The environment of "Branchless Banking Policy" in Pakistan has come a long way. The early

Source: Karandaaz Report, 2017

experienced the first movers' advantage however market share is showing shift with new entrants "Easy Paisa" being the top market player, taking the largest chunk of share and then followed by Omni, Mobicash time pay, U-Paisa, HBL Express and Mobile Paisa. In Pakistan, 2 models of mobile-money delivery are used to characterize branchless banking.



GDP. Currently the strengthening feature is that more than 33 million BB accounts/mobile wallets are present and more than 420,000 BB agents are offering access points for financial type followed by 14percent of M-Wallet transactions.

Out of 33 million BB accounts, 53percent are inactive, only 1/10 Pakistani own full-service accounts which can be accessed digitally. Only 7percent have digital finance accounts which are further bifurcated to 6.8percent who have digital bank account and 0.3 having mobile money accounts. Still, a large number of in-active BB account also demonstrate that the DFS eco-system is not demand driven and there exists a need to encourage customers activity [AFS 2015].

Customer awareness is also a challenge for the update of DFS ecosystem. Smart phone penetration on the whole is rising but remains low in certain parts of Pakistan and low-income client use basic cell phones at large. This weakness necessitates Fin-techs to build financial solution that are based

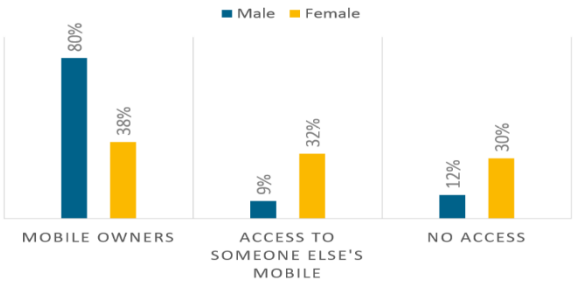
on USSD technologies. Further, nearly 72percent of organizations in Pakistan are not aware which Fin-techs are out there and looking for collaboration. Lack of interoperability is another threat; 12 players possess branchless banking license in Pakistan but without any interoperability among wallets. Lesser interoperability between BB players as due to;

- Lack of open API's at financial institutions.
- High cost of doing transactions.
- Reluctance of banks to collaborate with Fintech and startups have held back the flight of DFS eco-system in Pakistan.

In terms of mobile money delivery models, OTC dominates the market with 80percent of transactions type followed by 14percent M-Wallet transactions. Substantial portion of clients with M-Wallet accounts remain in-active, however, Pakistan has one of the highest percent of active accounts (43percent) in comparison to other developing regions like Latin America and Africa (42percent), South Asia (29percent), Middle East 22percent, East Asia and Pacific (22percent). Despite this promising percentage and push by the regulator for OTC to Wallet transition, on the whole, the providers have largely failed to convince cliental about the valuable regular usage and registration of mobile wallet account. Obvious of broad array of services offered by agents, the OTC transaction remain the "modus operandi" of the cliental with approx. 99 percent of agents executing their transactions.

In Pakistan, multiple reasons are mentioned for non-adoption of m-wallet by the customers.

ACCESS TO MOBILE PHONES



ABILITY WITH MOBILE PHONES

	Make Calls	Receive Calls	Send/Receive Text Messages
Do everything myself	62%	63%	34%
Somebody helps me with part of the activity	4%	3%	2%
Somebody helps me with entire activity	3%	3%	1%

During FGDs, women revealed key details about mobile ownership:

- Most do not see their mobiles as personal devices; mobiles are shared with husbands and children
- Women have to justify calls and messages to family members

Another weakness that is witnessed is that mobile phone capabilities affect the uptake of m-wallet. The stats are highly skewed toward males concerning mobile ownership and capabilities; leaving women in a disadvantageous position in both the domains. 80percent of the male possess ownership of mobile phones, 9percent have access to someone else mobile and nearly 12percent have no access compared to only 38percent of females owning mobile phones and 32percent have access to someone else mobile and about 30percent have absolutely no access. Even the ones e-ownership do not view their mobile phones as personal devises as those are shared by husbands and children. Access even becomes more complicated as women have to justify the calls they make and the money they spend. The dilemma does not end here; illiteracy/lack of education, comes into play where sending a text message is considered a tough task. As per stats, nearly 40percent state that they never text from their mobile phones. Majority finds the messages sent from cell phone providers, very difficult to understand as compared to understanding messages by friends and family.

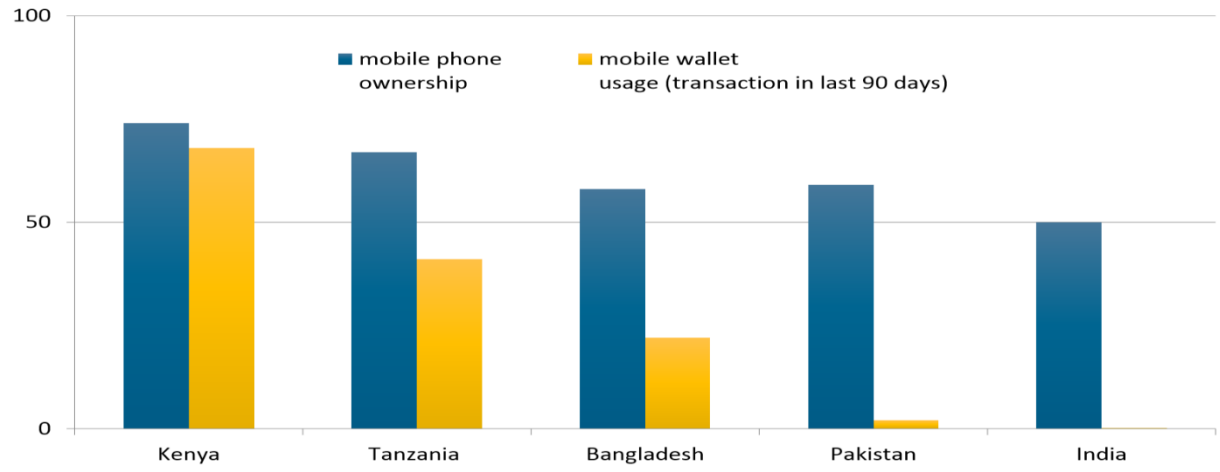
4.4.4 Economic and Demographic Landscape

The current economic and demographic landscape seems challenging but does possesses a window of opportunity for Fintech and digital lending in Pakistan. Pakistan is a country with 5th largest youth population, a potential market for financial services and products over the platform of mobile, social media, cloud and analytics (Rizvi et al. 2018). In a global comparison, there exists a grim state of financial inclusion in Pakistan as it ranks 16th out of 26 countries in a ranking done by Brooklyn institute, attaining an overall score of 69percent in "The state of Financial and Digital Inclusion Project Report-2017" (Kanwal, 2017). The ratio of financial inclusion is 15percent in Pakistan in comparison to an average of 33percent for lower middle-income countries.

The weakness of the system is that 100 million adults do not have access to regulated and formal financial services [World Bank Report on Financial Inclusion-2016]. Only 23percent of the adult population has access to formal financial services; 16 percent bank account compared to 11percent of adult women [AFS, 2015]. Only 2.9 percent Pakistani adults have debit cards where only 1percent adults use them to make payments. 1.4percent adults own an account to receive wages and 1.8percent use them for government transfers in 2014 [Framework for Rooting].

The financial and insurance services comprise 3.14percent of total GDP of Pakistan as compared to 6.8 percent of China and 5.15 percent for India (Rizvi et al. 2018), which, Pakistan ranks 144/190 countries in "ease of doing business" and has only 15percent investment to GDP ratio as compared to other emerging economies (Kanwal, 2017).

The microfinance (MFI) lacks sound and extensive distribution system. In comparison to mobile phone ownership with mobile wallet usage, Pakistan lags behind leading countries.



Source: Karandaaz Report, 2017

Who are the consumers of mobile-money services in Pakistan? mainly "Urbanite" and majority of population under 45 years of age using financial services. Out of 33 million mobile wallets accounts, 22percent of the accounts i.e. 7.4 million are owned by women. As mentioned earlier, 80percent of men have mobile phones as compared to 38percent of women, exhibiting gender

imbalance. Juxtaposing opportunities, the banking industry covers 80percent of the financial services but, only caters 15percent of the population leaving a door open for Fintech to provide digital payment solutions and serve the disadvantaged population (Kanwal, 2017). This optimism is depicted in the Mckinsey Global Institute report of "Digital Finance for all: powering inclusive growth in emerging economies" that forecasts financial technology adoption in Pakistan will add 93 million bank accounts and 36 billion dollars per year to the GDP of the country by 2025 while creating 4 million jobs and adding 7 billion dollars to the government revenues. Mckinsey report state, "Pakistan has sound digital infrastructure and financial regulation in place and even had some success in digital domestic-remittances payments".

As digitization is low in Pakistan, the weakness serves as a potential opportunity for the growth of Fintech (Shahid et al. 2016), see the end of (Rizvi et al. 2018).

4.5. CONCLUSION

The world is witnessing phenomenal Fintech growth driven mainly by technological innovations, varying consumer preferences and behaviors, and regulations. Fin-techs are at the confluence of various technologies, enhancing customer experiences with the provision of well personalized and interactive financial services to the customers which allows them to conduct transactions over their phones. On a wider level, fin-techs are significantly contributing to the cause of financial inclusion by providing new financial products and services to the groups of people, previously deprived of conventional financial services.

Pakistan, being a developing economy has a large percentage of unbanked population due to high banking infrastructure costs acting as a barrier to diffusion of financial services. Low levels of financial inclusion, along with increasing mobile phone and internet penetration, varying consumer

needs in favor of digitization and e-commerce, biometric verification of mobile SIMs and a supportive regulatory environment serve as opportunities for fin-techs to step in and provide affordable financial products to the financially excluded population. Our findings are that currently the fin-tech eco-system in Pakistan is limited with handful of actors in the market. Presently, few traditional and nascent fintech's are operating in Pakistan, mainly in the areas of banking and insurance. Further as per "Digital Maturity Matrix" benchmark and the spectrum of products and services offered by FSPs and fin-techs, the digital financial landscape of Pakistan is at the level of "Early Stage Digital" .Our SWOT analysis shows that there are considerable opportunities and strength areas along with certain deeper weaknesses; however the horizon for propagation of digital financial services is optimistic and a positive role is played by the regulators; the State Bank and Pakistan Telecommunication Authority in strengthening the conducive environment for promotion of digital financial inclusion. We believe that it will be essential for the innovation to follow a successful growth strategy and combine them with fin-techs in the.

Overall Conclusion

Financial inclusion is the process of including the people lacking formal and affordable financial services into the formal financial system. Despite the current focus of policies and regulations devoted to enhancing access to finance in Pakistan, there is a number of underlying factors causing financial exclusion. The main goal of the study was to determine the factors affecting financial inclusion level in Pakistan, and suggest policy measures to improve the level of inclusion. In connection to this purpose, The *First essay* of this study investigated the predominantly neglected dimension of financial inclusion; the *Demand Side of Financial Inclusion*; This study employed number of indicators of demand side for Pakistan; using the emerging *Evidence based approach* of combining theoretical insights with data & employing econometric technique of *ARDL;* we measured the dimensions of demand side, *Usage* and *Barrier;* from two perspectives; *The Banked (Usage dimension)* and *The Unbanked (Barrier dimension)* segments of society. The Unbanked side was further analyzed by bifurcating it in *Voluntary Barrier to Financial Inclusion* and *Involuntary Barrier to Financial Inclusion*. We further developed an *index* for *demand side of financial Inclusion*. The results showed that that the co-efficient for the dimension of Usage, Barrier (Voluntary), Trust & Banking determinants of demand side are highly significant. The empirical findings suggest that voluntary barriers to Financial Inclusion have a more negative or deteriorating effect as compared to involuntary barriers in Pakistan. This is an important finding of the study as latest literature on Financial Inclusion also focusses on the phenomenon of self-exclusion.

The trust on the banking sector and the Banking Sector determinants of demand side also have high weighted co-efficient values. This indicates that regulatory framework and the Bank specific factors, balance sheet channel and financial health of banking sector possesses a significant impact

on the Financial Inclusion landscape of Pakistan. The regulatory framework contribute to Financial Inclusion and government's intervention and implementation can directly impact the level of financial inclusion in Pakistan. In the light of the outcomes of the study, the "Policy Recommendations" are:

- Devising products that are appropriate for disadvantaged segments of society like no-frill deposit accounts; softer loans with low interest rates and frequent small installments; and gender responsive products for women who essentially face high financial exclusion.
- The regulator should play the role of implementing financial inclusion process through strict prudential regulations.
- Women are deeply financially excluded as per our results. The phenomenon of exclusion is more exacerbated in rural population. The regulator must take up the role of creation of gender-responsive financial products to be introduced by the main stream banking sector

From the study it is evident that the Banking determinants stand out with greatest impact on Financial Inclusion which is positive and reinforcing in nature. Thus, results corroborate with the evidence that *85 percent* of the *16 percent financially included* of Pakistan are served by Banking Sector in terms of financial products and services. Thus, the onus of financial inclusion lies on Banking Industry where the demand portfolios and micro determinants contribute to Financial Inclusion process.

The *second essay* of this study gave the *Supply Side of Financial Inclusion* the due focus and investigated the financial inclusion process for Pakistan by supply side – the top down approach by employing number of indicators of supply side; measured the supply side dimension of *Access*, a first time secondary data measurement by using data of all bank types of banking sector of Pakistan. In this context, the study dealt with the socio-economic and financial factors determining

financial inclusion in Pakistan. The empirical findings suggest that the greater size, geographic outreach & demographic outreach of the banks, the greater the contribution to the financial inclusion. We also modeled other important predictors of Advances Personal (LADV PER), Advances by Rate of Interest (ADV ROI) & Advances by Size of Account (LADV SOA) & Advances Super Inclusion (LSIAM). The results signify that improvement in soft consumer loans reinforces financial inclusion and increase in low sized, no frill advances contribute to the Financial Inclusion

We also investigated Super Inclusion of Up-market in the supply side model of financial Inclusion. The Super Inclusion exhibits negative relation with financial Inclusion & unit rise in large size loans decreases the financial Inclusion of supply side.

Our findings have several implications and policy recommendations. First, as promoted by the United Nations, the building of an inclusive financial system is a significant way to achieve the SDGs and to uplift the worldwide economy. At the macro level, the Government of Pakistan should play a constructive role by incorporating financial inclusion into national development strategies. Additionally, the relevant legislative and regulatory work required to help with this achievement should be improved. At the meso-economic level, society should play its role in constructing a poor-friendly financial infrastructure which can provide affordable financial services to them. At the micro level, development of micro finance should be focused upon to improve financial inclusion.

Second, for Pakistan which is at a low stage of financial inclusion progressiveness, the government should promote the opening up of domestic financial markets which has the ability to absorb the positive effects of the international financial inclusion development. Global financial market synergy and linkage can help to absorb these spatial spillover effects brought on by developed

countries. Third, according to empirical results, total assets of banks, the bank network and the demographic out reach of banks significantly and positively enhance financial inclusions process from supply side dimension. Also advances to individuals and size of loans also has impact on financial inclusion while collateralized loan being in appropriate product have negative impact on financial inclusion process. The banks must consider these aspects while devising products for larger masses. Finally, Pakistan should strengthen its ties with international financial organizations like Alliance for Financial Inclusion (AFI) and GPFI to exchange experiences for the purpose of developing effective financial inclusion strategies.

To overcome the disconnect of *Access* & *Usage*, where access essentially does not translate into Usage & to ensure mass access to financial services, financial literature can prove instrumental to overcome the problem of informal lending and its associated risk. As educated persons essentially informed about the benefits of using the formal financial system, they are more likely to use those. Therefore, policy alternative should be designed to communicate the benefits of financial service to non-users and making them financially literate.

The *third essay* of the study performed a broad based assessment of *Credit Risk & financial inclusion nexus* by using a panel of 48 banks of Banking sector of Pakistan, employing approx. 1,000 balance sheets over period of 2001 to 2017; evaluated whether credit risk of banking sector increases or decreases due to financial inclusion; whether financial Inclusion is less risky-sound investment or high risk-bad investment for banking sector of Pakistan.. Using logit discriminant analysis, this study developed a multifactor model which presents the relationship between the NPL's; a measure for credit risk of banks and bank's sensitivity to financial Inclusion determinants of supply side.

The study indicates that NPL are highly affected by financial inclusion determinants of supply side and micro characteristics. The study put forth a strong evidence that Pakistan's banking sector displays considerable credit risk due to greater probability where relationship of financial inclusion with credit risk is negative in nature.

The model is useful in providing warning signals of any upcoming crises as it highlights the determinants and magnitude of risk; so that protective measure can be sought for immunizing the economy and protect it from contagious, potentially lethal financial diseases.

The fourth and last essay of this study offers an Evidence-Based-Way-Forward Approach for digital financial inclusion in Pakistan by providing an extensive overview of digital lending & Fin-tech eco-system of Pakistan; performs a qualitative SWOT assessment of economic, demographic, branchless banking & technological landscape, conducive for the penetration and growth of fin-tech in Pakistan.

The world is witnessing phenomenal Fintech growth driven mainly by technological innovations, varying consumer preferences and behaviors, and regulations. Fin-techs are at the confluence of various technologies, enhancing customer experiences with the provision of well personalized and interactive financial services to the customers which allows them to conduct transactions over their phones. On a wider level, fin-techs are significantly contributing to the cause of financial inclusion by providing new financial products and services to the groups of people, previously deprived of conventional financial services.

Pakistan, being a developing economy has a large percentage of unbanked population due to high banking infrastructure costs acting as a barrier to diffusion of financial services. Low levels of financial inclusion, along with increasing mobile phone and internet penetration, varying consumer needs in favor of digitization and e-commerce, biometric verification of mobile SIMs and a

supportive regulatory environment serve as opportunities for fin-techs to step in and provide affordable financial products to the financially excluded population. Our findings are that currently the fin-tech eco-system in Pakistan is limited with handful of actors in the market. Presently, few traditional and nascent fintech's are operating in Pakistan, mainly in the areas of banking and insurance. Further as per "Digital Maturity Matrix" benchmark and the spectrum of products and services offered by FSPs and fin-techs, the digital financial landscape of Pakistan is at the level of "Early Stage Digital" .Our SWOT analysis shows that there are considerable opportunities and strength areas along with certain deeper weaknesses; however the horizon for propagation of digital financial services is optimistic and a positive role is played by the regulators; the State Bank and Pakistan Telecommunication Authority in strengthening the conducive environment for promotion of digital financial inclusion. We believe that it will be essential for the innovation to follow a successful growth strategy and combine them with fin-techs in the future.

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Appendix-I

Table 1 (A): Summary of ADF Test-Demand Side

		Stationary at				
Variable name		**Levels**	**1st Difference**	**T-Stat**	**Trend**	**T-Stat**
Total Deposits in millions	*LogDEPB*		yes	-6.344345	yes	-2.283458
# of Banks	*LogBNKTOT*		y	-5.523887		
# of Branches	*LogBBRtot*		y	-3.300996		
S	*STOT*		y	-6.687395	y	-1.655008
E-Transaction Amount	*EBANKTRAMOUNT*					
	LEBNKTR	y	-5.737789		y	5.465793
Per Capita Income(FC) in Rs	*YPERCAPITA*					
	LYPC		y	-5.910941	y	0.002655
Un Employment	*UNEMP*		y	-7.261802	y	-1.358843
Super Inclusion Up Market (Total Dep)	*SUMKTAMOUNT*					
	LISUMKT		y	-6.853964		
Super Inclusion Up Market Collatoral	*SUMKTCOLLAMNT*					
	LSUMKTCOL		y	-4.664178	y	-1.617110
Rural Population	*RURALPOP*					
	LRPOP		y	-6.304047	y	-1.423941
Female Population	*FEPOPGender*					
	LFEPOP		y	-10.97710	y	-3.234436
Age GP Child & Old Age	*AGEGPCO*					
	LAGEGP	Y -3.107092				
Financial Illiteracy	*FINILLGender*					
	LFINLIT		y	-8.940640		
Deposits of Fin Inc. Accounts Total Amount	*DEPFINCTOT*					

	LDEPFTOT		y	-5.442370		
Deposits Current Account Amount	*DEPCAAMOUNT*					
	LDEPCA		y	-8.134514	y	0.457738
Deposits Saving Account Amount	*DEPSAVAMOUNT*					
	LDEPSAV		y	-5.879487		
Deposits Fixed Account Amount (Short Term)	*DEPFIXAMOUNT*					
	LDEPFIX		y	-5.235222		
Deposits of Micro Fin.Ins	*DEPMFIAMOUNT*					
	LDEPMFI		y	-9.251881		
Deposits of Individuals	*DEPPERSONAL*					
	LDEPPER		y	-4.341157		
Deposits by Rate of Interest	*DEPROI*					
	LDEPROI		y	-2.965920		
Deposits FINC as per Size of Account	*DEPSOA*					
	LDEPSOA	Y -3.790808				

Table 1 (B): Summary of ADF Test-Supply Side

	Stationary at				
Variable name	**Levels**	**1st Difference**	**T-Stat**	**Trend**	**T-Stat**
LTADV		y	-4.664178	y	-1.617110
LSIAM		y	-4.776720	y	-1.517813
LDOUT		y	-7.013687	y	0.960419
LTA	Y -3.665460			y	3.620251
LBNK		y	-5.690969	y	-1.271270
LBBR		y	-3.300996		
LADVMFI		y	-2.917916		
LADVPER		y	-5.509619	y	-1.287837
LADVROI	Y -3.531953				
LADVSOA		y	-4.301684	y	-1.626460
LADVCOL		y	-4.664178	y	-1.617110

Appendix-II

ANNEX I: BANKING MERGERS & AQUASITIONS: 2000-2017

- Atlas Bank acquired the operation of Dawood Bank Ltd. w.e.f 14-2-2006
- After the merger of Metropolitan Bank Ltd and Habib Bank AG Zurich, Habib Metropolitan Bank Ltd. was established w.e.f 16-10-2006
- AEB and Jahangir Siddiqui Investment Bank merged and declared as JS Bank w.e.f. Dec, 06
- merger of Mashreq Bank and Crescent Investment Bank on 9th July 2003, Mashreq Bank Pakistan Ltd. Was established, renamed as Crescent Commercial Bank Ltd. w.e.f. 31st March 2004. Crescent Commercial Bank Ltd was renamed as Samba Bank Ltd. w.e.f 20th October,2008.
- Saudi Pak Commercial Bank Ltd. has changed its name to Silk Bank Ltd effective from June 01, 2009.
- SME declared as a specialized Bank w.e.f Sep 2004
- Standard Chartered Bank (Pakistan) Ltd was established as a result of merger of Union Bank Ltd and Standard Chartered Bank on 19-5-2006.
- Merger of M/s. PICIC Commercial Bank Limited with and into M/s. NIB Bank Limited. 31-12-2007
- Merger of KASB Bank Limited, KASB Capital and Atlas Bank Limited. 07-11-2008
- Merger of Al Baraka Islamic Bank B.S.C Pakistan Branches and Operations with and into Emirates global Islamic Bank Limited. 28-10-2010
- Merger of Atlas Bank Limited with and into Summit Bank Limited. 28-01-2011
- Merger of Mybank Limited with and into Summit Bank Limited. 31-05-2011
- Merger of Faysal bank and RBS. Jan 2011

Source:
Financial Position of the banks 2001-2005; 2006-2010 SBP
Competition Commission of Pakistan

ANNEX II : VARIABLE CONSTRUCTION : BANK SPECIFIC VARIABLES

	Variable Construction	**Name**
1.	***SETA=A1+A2+A3/C1+C2+C3+C4+C8+C9+C10**	*Book value of stockholder's equity* to total asset ratio
2.	***RETA=A2+A3/C1+C2+C3+C4+C8+C9+C10**	Retained earnings to total asset ratio
3.	***WCTA=(C1+C2+C3)–(B1+B2+B3)/ C1+C2+C3+C4+C8+C9+C10**	Working capital to total assets ratio Working Capital = Current Assets – Current liabilities
4.	**MEQTL = R*/ B1+B2+B3+B4**	*Mkt. value of equity* to book value of total liabilities ratio
5.	**DBERM= B1+B2+B3+B4/ A1+A2+A3**	Debt To Equity Ratio
6.	GADV = C5 **GAD = DLOG(GADV)**	Gross advances Gross advances growth rate
7.	As: **NI=D10** $(NI_t - NI_{t-1})/(\lvert NI_t \rvert + \lvert NI_{t-1} \rvert)$	Net Income Change in net income in current year and previous year
8.	**INTWO =1 if $D10_t$< 0, 0 otherwise**	A dummy variable, 1 if net income is negative for last two years,0 otherwise
9.	**OENEG= 1 if B > C, 0 otherwise**	A dummy variable, 1 if total liabilities exceed total assets, 0 otherwise

Source: Financial Position of the banks, SBP