THE ROLE OF FINANCIAL DEVELOPMENT ON THE SIZE OF THE INFORMAL SECTOR OF PAKISTAN

By

Mohammad Abdul Rehman Ansari
PIDE2020FMPHILBE03

Supervisor

Dr. Ahmad Fraz
Dr. Ahsan-ul-Haq

MPhil Business Economics
PIDE School of Economics
Pakistan Institute of Development Economics, Islamabad
2023

Pakistan Institute of Development Economics
P.O. Box 1091, Islamabad, Pakistan

CERTIFICATE

This is to certify that this thesis entitled: **"The Role of Financial Development on the Size of the Informal Sector of Pakistan".** submitted by **Mr. Mohammad Abdul Rehman Ansari** is accepted in its present form by the School of Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Business Economics.

Supervisor:	Dr. Ahmed Fraz	Signature:
Co-Supervisor:	Dr. Ahsan ul Haq	Signature:
Internal Examiner:	Dr. Farhat Mahmood	Signature:
External Examiner:	Mr. Muhammad Ali Kemal	Signature:
Head, PIDE School of Economics:	Dr. Shujaat Farooq	Signature:

AUTHOR'S DECLARATION

I **MOHAMMAD ABDUL REHMAN ANSARI** hereby state that my PhD thesis titled "THE ROLE OF FINANCIAL DEVELOPMENT ON THE SIZE OF THE INFORMAL SECTOR OF PAKISTAN" is my own work and has not been submitted previously by me for taking any degree from Pakistan Institute of Development Economics or anywhere else in the country/world.

At any time if my statement is found to be incorrect even after my Graduation the university has the right to withdraw my PhD degree.

Date: 20/2/23

Signature of Student

MOHAMMAD ABDUL REHMAN ANSARI

ACKNOWLEDGEMENTS

First of all, I would like to thank Dr. Ahmad Fraz (Supervisor) and Dr. Ahsan-ul-Haq (Co-Supervisor) whose expertise allowed the completion of this study. I would also like to appreciate my friends Muhammad Nafees, Tayyab Ayaz, and Muhammad Wali Farooqi for sparing their valuable time for discussion on the topic of research. Lastly, I would also like to thank my parents for supporting my decision to go for an MPhil degree from the Pakistan Institute of Development Economics.

ABSTRACT

The study analyzes the role of financial development (FD) using financial stability, financial efficiency, financial depth, financial access, and mobile financial services (MFS) on the size of the informal economy (INF) of Pakistan. For data analysis, annual time-series data over the period of 1990-2020 has been used and the study employed the auto-regressive distributive lag (ARDL) model to investigate the short-run and long-run relationship between the variables. In the short run and long run, FD has a negative relationship with the size of the informal economy. Two dimensions of FD, financial access and financial efficiency have a negative and positive impact on the size of the informal economy, respectively. Whereas, financial depth and financial stability have no significant relationship with the informal economy. MFS, on the other hand, has an inverse relationship with the informal economy in the short run. Policymakers can use financial development as an effective tool for reducing the level of informal activity in Pakistan. Increased access to financial services through bank expansion and mobile applications could encourage economic agents towards formality and reduce tax evasion. However, financial policies are required to accelerate access to financial services and resolve the demand side and supply side issues of private sector credit.

Keywords: Informal Economy, Financial Development, Mobile Financial Services, Autoregressive Distributed Lag Model, Multiple Indicators, and Multiple Causes

TABLE OF CONTENTS

LIST OF FIGURES

Number *Page*

LIST OF TABLES

Number *Page*

LIST OF ABBREVIATIONS

α	Alpha
β	Beta
AEs	Advanced Economies
AIC	Akaike Information Criteria
ARDL	Autoregressive Distributed Lag
CDNS	Central Directorate of National Savings
DFIs	Development Finance Institutions
EMDEs	Emerging Market and Developing Economies
ETS	Department of Econometrics and Statistics
FD	Financial Development
GFDD	Global Financial Development Database
GDP	Gross Domestic Product
ILO	International Labour Organization
INF	Informal Economy
MFBs	Microfinance Banks
MIMIC	Multiple Indicators Multiple Causes
NBFIs	Non-Banking Financial Institutions
NFIS	National Financial Inclusion Strategy
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
PCA	Principal Component Analysis
PIDE	Pakistan Institute of Development Economics
SBP	State Bank of Pakistan
SECP	Securities and Exchange Commission of Pakistan
USA	United States of America
UK	United Kingdom
VAR	Vector auto-regression

CHAPTER 1

INTRODUCTION

1.1 Introduction

The informal economy (INF) is a universal feature of all countries across the globe and continues to exist in every jurisdiction. It is known by many other names, such as black, hidden, grey, shadow, and unofficial economy. The informal economy (INF) is defined as "*all economic activities by workers and economic units that are, in law or in practice, not covered or insufficiently covered by the formal arrangements*" (ILO). According to the World Bank's Informal Economy Database (2018) on average globally the size of the informal economy comprises 31.9 percent of GDP. The United States accounts for the lowest informal economy with 8.2 percent of GDP. Whereas, Bolivia holds the highest level of 62.8 percent of its GDP. In addition, it is also found that the advanced economies (AEs) account for 17.6 percent of their economic activity in the informal economy, that is, almost half of the emerging market and developing economies (EMDEs) of 35.6 percent of GDP.[1] Being a developing country, Pakistan also holds a significant portion of its economic activity in the informal economy, i.e. 34.2 percent of its GDP.

A sizeable portion of the informal economy can cause serious microeconomic distortions and macroeconomic losses (Jacolin et al., 2019). The government's ability

[1] The term *Advanced Economies* and *Emerging Market and Developing Economies* is based on the definition given by the International Monetary Fund.

to mobilize domestic resources for financing public goods is compromised due to higher tax evasion, leading to low quality of public goods. Furthermore, a large informal economy can also raise the inaccuracy of the national accounting statistics which would ultimately undermine the effectiveness of regulations undertaken by the policymakers.

An abundance of literature has pointed out issues pertaining to public policy and public administration to be the key drivers of informal activity (Schneider and Enste, 2000). However, over the past decade, many scholars have shifted their focus toward financial development's influence on reducing INF (Antunes and Cavalcanti, 2007; Blackburn et al., 2012; Bose et al., 2012; Berdiev and Saunoris, 2016; Capasso and Jappelli, 2013; Ellul et al., 2016; Jacloin et al., 2019 Straub, 2005). There is a consensus among the scholars studying this relationship that a robust and developed financial sector raises the opportunity cost for participating in the informal economy. This is because a developed financial sector allows the disbursement of credit at a lower cost which in turn incentivizes economic agents to reveal their revenues to avail the benefits of the formal financial sector rather than avoiding taxes by hiding their financial information. **Appendix A** also confirms that FD and the informal economy do have a negative relationship.

Appendix A represents the country-wise comparison of "getting credit score" against the size of the informal economy. The "getting credit score" is extracted from the World Bank's "Doing Business". The score captures two characteristics of access to finance – the effectiveness of bankruptcy laws and collateral, and the strength of the credit

reporting system.[2] Generally, advanced economies like the USA, UK, New Zealand, Australia, and others have a higher "getting credit score" due to their well-developed financial sector. At the same time, the size of the informal economy is very low. Moving from right to left along the horizontal access it is evident that as the "getting credit" score decreases INF across the countries increases. This aspect is particularly true for developing countries like Pakistan, Bangladesh, Brazil, the Philippines, and Sri Lanka which have lower "getting credit scores" and a higher portion of the informal economy.

Despite the clear evidence that FD does impede informal activity, the concerned literature (Antunes and Cavalcanti, 2007; Blackburn et al., 2012; Bose et al., 2012; Berdiev and Saunoris, 2016; Capasso and Jappelli, 2013; Ellul et al., 2016; Jacloin et al., 2019 Straub, 2005) does not adequately capture the definition of FD. As highlighted by Svirydzenka (2016), most of the literature only uses the private sector to GDP or stock market capitalization as a percentage of GDP for measuring FD. Thus, this study attempts to widen the scope of FD and then analyze its significance in the INF of Pakistan.

Apart from reducing the size of the informal economy, financial development can also play an important role in supporting the success and growth of businesses in general. Financial development has the ability to provide businesses with increased access to capital markets, access to capital, improved efficiency, better risk management tools, and information on present and future market dynamics. This enables businesses in

[2] https://subnational.doingbusiness.org/en/data/exploretopics/getting-credit/what-measured

making informed economic decisions that is critically important for the growth of the business sector. Therefore, considering the benefits of the financial development, not only formal business have the opportunity to grow and develop but also it has the ability to incentivize informal businesses towards the formal economy.

1.2 Problem Statement:

More than one-third of Pakistan's economic activity is generated by the informal economy which can have adverse macroeconomic implications. A higher informal economy means higher tax evasion, hence, compromising the government's ability to finance its fiscal operations. An informal economy also has the ability to undermine the effectiveness of policy measures as it misrepresents the true nature of economic activity. A number of factors can be pointed out that influence the INF in Pakistan, however, the current study examines the role of FD in this regard. FD is an incentive-based approach (Blackburn et al., 2012) as it encourages economic agents to the formal sector.

1.3 Research Questions:

Based on arguments made in the previous section, the current study focuses on addressing the following research questions:

1. What is the role of financial development in explaining the INF of Pakistan?
2. Which dimension of financial development (access, depth, efficiency, and stability) is relatively more significant in reducing the INF in Pakistan?
3. What is the significance of having Mobile Financial Services for contributing to the INF of Pakistan?

4. What is the perception of the financial regulators regarding the role of FD in the INF of Pakistan?

1.4 Research Objectives:

The study has the following objectives:

1. To analyze whether the development of the traditional financial sector on an aggregate level has encouraged participants in the informal economy toward the formal economy.
2. To determine which dimension of development (financial access, financial depth, financial efficiency, and financial stability) has been more effective in reducing the size of the informal economy.
3. To examine the role of Mobile Financial Services in reducing informal activity in Pakistan.
4. To gain the perception of the financial regulators regarding the relative importance of FD, its dimension, and Mobile Financial Services in reducing the size of the informal economy of Pakistan.
5. Review the existing policy measures introduced by the financial regulators.

1.5 Research Gap

Most of the studies addressing the relationship between financial development and the size of the informal economy are primarily cross-sectional and panel analyses. The literature (Bose et al., 2012; Cappasso and Jappelli, 2013; Berdiev and Saunoris, 2016; Jacolin et al., 2019; Canh and Thanh, 2020) does not adequately capture the concept of

FD. Most of the literature has relied on credit indicators which only capture the depth of the financial sector. The use of credit indicators as a sole measure of FD may even misrepresent the level of FD (Cihak et al., 2012). Canh and Thanh (2020) investigated further by including three dimensions of FD (i.e. access, depth, and efficiency).

As opposed to the previous studies, the current study is the first to examine the relationship between FD and the informal economy of Pakistan. With reference to FD, the current study incorporates another dimension that is not considered by the previous literature, i.e. the stability dimension. Another aspect that the current study envisages covering is to compare whether the traditional financial sector (namely the banking sector) or the emerging Fintech sector (Mobile Financial Services) is relatively significant in reducing the informal economy.

1.6 Research Significance

The findings of the study hold relevance to the financial sector regulators of Pakistan, namely, the State Bank of Pakistan and the Securities and Exchange Commission of Pakistan. First of all, the study will confirm whether the regulatory measures taken in the past for the development of the financial sector have had any impact on reducing the size of the informal economy. Secondly, the dimension-wise analysis will guide the policymakers in making targeted measures in reducing the informal economy. For instance, a particular dimension of FD which the study founds to have a more significant impact on the informal economy could help policymakers to bring in regulatory measures along the same lines in curbing informal activity. By including MFS in the study, the policymakers will also be informed regarding the role of

technology-based financial services in the informal economy. Thus, based on the significance of MFS, policymakers will be able to decide whether there is a need to promote other fintech-based services to encourage economic agents toward the formal sector. Overall, the study can provide key insights to the financial regulators in promoting FD and mitigating the informal economy. Moreover, mitigating INF would lead to lower tax evasion consequently improving the government's finances.

1.7 Organization of the Thesis

The second section of the document discusses the existing literature, both theoretically and empirically. The third chapter describes the existing financial sector landscape of Pakistan. The next chapter discusses the qualitative part of the study. Data and the methodology used for the analysis are discussed in the fifth chapter. The sixth chapter provides the results and discussion of the empirical analysis of the study. Whereas the seventh and eighth chapter provides a conclusion and policy references, respectively.

CHAPTER 2

LITERATURE REVIEW

This section provides a review of the relevant literature to the study. First of all, literature pertaining to the methodology used for measuring FD and the informal economy is discussed. After reviewing the methodology, the study then reviews relevant empirical studies and discusses their empirical findings. Finally, the study establishes theoretical background by discussing the related literature that has theoretically established the link between FD and the informal economy.

2.1 Literature Review

Most parts of the literature asserted on public administration and public policy issues are the key factors influencing the informal economy.[3] Amongst these include regulatory burden, tax burden, the extent of bureaucracy, complexity of the tax system, social security contributions, rent-seeking, and corruption (e.g. Friedman et al., 2000; Johnson et al., 1998a,b; Loayza, 1996, Schneider and Enste, 2000, 2002; Schneider and Neck, 1993). While the importance of these factors remains, the role of the financial sector has also been studied both theoretically (Antunes and Cavalcanti, 2007; Blackburn et al., 2012; Capasso and Jappelli, 2013; Ellul et al., 2016; Straub, 2005) and empirically (Capasso and Jappelli, 2013; Berdiev and Saunoris, 2016; Bose et al., 2012; Jacloin et al., 2019). Based on the aforementioned studies, it is generally agreed that a more developed financial sector is likely to reduce the spread of the

[3] See Schneider and Enste (2000) for the detailed discussion of the factors.

informal economy. One of the important functions of the financial sector is to provide credit and monitor business transactions. But, as the financial sector develops, it reduces the obstacles to obtaining credit. As a result, it raises the opportunity cost for the entrepreneurs to operate in the informal economy and incentivizes them toward the formal economy. In addition, informal activity is further mitigated due to lower tax evasion as the government is able to monitor transactions for taxable purposes. (Capasso and Jappelli, 2013; Blackburn et al., 2012).

FD is a multi-dimensional aspect, nonetheless, most of the literature measures it with two indicators, private sector credit as a percentage of GDP and, to some extent, stock market capitalization as a percentage of GDP (Svirydzenka, 2016). While these indicators capture the depth, that is, size and liquidity of the financial sector, there are other areas as well through which FD can be achieved. These areas include "access", "efficiency", and "stability". In addition to the depth dimension, Svirydzenka (2016) includes access and efficiency aspects for measuring FD. Access measures the "ability of individuals and companies to access financial services, whereas, efficiency measures the "ability of institutions to provide financial services at low cost and with sustainable revenues". Furthermore, the study also points out that the financial sector comprises two sub-sectors, i.e., financial institutions (banks, insurance companies, venture capitals, and other non-banking financial institutions) and financial markets (bond markets, stock markets, foreign exchange markets, money market, and by-passing traditional bank lending).

Contrary to the previous study, the World Bank's Global Financial Development Database (GFDD) takes a broader approach to FD by including the stability

dimension. The stability of the financial sector measures the ability of the financial sector to function smoothly by allocating capital efficiently, effectively managing financial risk, and removing relative price movement of real or financial assets that will affect employment levels or monetary stability. The importance of a stable financial sector gained momentum after the Global Financial Crisis (2008), however, this aspect has been largely ignored in the context of FD.

Computing the extent of the informal economy of any jurisdiction is considered a challenging task as the individuals involved in this area tend to hide their economic activity and financial information. Nonetheless, numerous studies have come up with various methods to attain accurate results on the degree of the informal economy. The existing measures can be divided into two approaches, the direct approach, and the indirect approach. While the direct approaches are largely survey-based, the indirect approaches are mostly macroeconomic in nature. The current study will focus on indirect approaches some of which are discussed in this section.

The discrepancy between income statistics and national expenditure is one way of measuring the informal economy. The intuition behind this measure is that economic agents involved in the informal economy are able to conceal their income to avoid paying taxes but not their expenditures. Thus, differencing the income and expenditure at an aggregate level would provide estimates of the shadow economy This method undertakes that the constituents of the expenditure side are measured accurately and is independent of other factors (Medina and Schneider, 2018). [4]

[4] See MacAfee (1980) and Yoo and Hyun (1998)

The discrepancy between the actual and official labor force is another way of estimating the informal economy. This technique assumes labor force participation to be constant, so an increase or decrease in labor force participation is interpreted as a decrease or increase in the importance of the informal economy, respectively. The drawback of this measure is that the estimates are relatively weak because the fluctuations in labor force participation can be caused by other factors such as retirement decisions, business cycle position, frictional unemployment and etc.[5]

The *Electricity Consumption Approach* was endorsed by Kaufmann and Kaliberda (1996). This approach assumes that the consumption of electricity is the most relevant indicator for measuring overall economic activity, both unofficial and official. The authors further suggested that differencing the growth rate of official GDP with electricity consumption is a proxy for the informal economy's growth rate. While this approach is also simple but it does not fully capture the growth rate of an informal economy. One of the notable shortcomings of this approach is that not all informal activity requires electricity consumption, there are other sources as well, such as coal and gas. Moreover, some informal activity doesn't require energy consumption at all, such as personal services.[6]

Tanzi (1980) advocated the *Currency Demand Approach*. This approach assumes that all informal transactions are made on a cash basis in order to conceal the performed transactions from government officials. Therefore, an increase in demand for cash is considered an upsurge in the extent of the informal economy. In order to extract the access demand for cash, the author utilized time series data where currency demand

[5] See Del Boca (1981), O'Neil (1983), and Contini (1981)
[6] See Del Boca (1982), Portes (1996), and Johnson et al., (1997)

functioned in terms of conventional factors (interest rates, payment practices, and evolution of income) and factors influencing participation in the informal economy (tax system complexity, tax burden, and regulatory burden). Nevertheless, this approach also has several weaknesses in terms of assumptions made and the methodology used. First of all, assuming the shadow economy to be zero in a base year is a weak assumption. Secondly, the estimates may undervalue the true degree of the informal economy as not all transactions are performed via cash as a means of payment. Lastly, growth in currency in circulation does not necessarily reflect a surge in informal activities, instead, other factors such as the decline in demand deposits may also play a key role.

The *Multiple Indicators and Multiple Causes (MIMIC) Approach* was developed by Joreskog and Goldberger (1975) and Zellner (1970) and. It is a theory-driven approach used to confirm the effect of exogenous causal variables on the unobservable variable (latent variable). Thus, under the MIMIC approach the informal economy is considered a latent variable, and explicitly includes several causes and multiple effects for estimating the degree of an informal economy. Frey et al. (1984) was the first study that captured this aspect through the MIMIC model for 17 OECD countries. Following them, other studies have also used the MIMIC approach to capture the extent of the informal economy (Schneider et al., 2010; Hassan and Schneider, 2016; Buehn et al., 2009; Medina and Schneider, 2017).

The domestic literature does not adequately cover the informal economy through the lens of financial development. However, scholars have documented studies on the informal economy of Pakistan with respect to measuring its size, exploring its

determinants, and its interaction with the official economy. First of all, as far as measuring the size of the informal economy of Pakistan is concerned, most of the literature has followed Tanzi (1983).[7] For instance, Kemal (2007) estimated the size of the informal economy of Pakistan using the Monetary Approach based on the works of Tanzi (1980, 1983). Over the period of 1974 to 2005, the study found an informal economy in the range of 54.6% to 62.8% of GDP. Apart from estimating the size of the informal economy, the study also analyzed the interaction of the informal economy with tax evasion and the official economy. With reference to tax evasion, the presence of an informal economy promotes tax evasion as the government raises tax rates to cover its financing deficit in a minimum amount of time. Higher tax rates encourage tax evasion, thereby, further raising the informal economy and putting more pressure on government revenues. With the help of Cointegration, the study found a positive long-run association between informal and formal economies. On the other hand, the VAR analysis showed a positive effect of the informal economy on the official economy in the short-run, but no impact of the official economy on the informal economy in the short-run.

Ahmed and Hussain (2008) also deployed Modified Tanzi's Approach and estimated the size of the informal economy of Pakistan over the period of 1906 to 2003. OLS estimation estimated the average size of the informal economy between 25.22% and 30.51%. The study also focused on the role of the Tax Reforms of 1997 on the

[77] See Ashraf and Kemal (2019)

informal economy. Using the dummy for the tax reforms the study found that the reforms were effective in reducing the informal economy.

Arby, Malik, and Hanif (2010) used three difference approaches for the estimation of the informal economy, namely, the Modified Tanzi Approach, MIMIC Approach, and Electricity Consumption Approach. The paper uses the ARDL approach for estimating the currency demand equation for the period of 1966 to 2008 resulting in the average shadow economy being 29.68% of the GDP. For the MIMIC approach structural equation models (SEMs) were utilized which indicated the average shadow economy to be 29.43% of the GDP. Lastly, the Electricity Consumption Approach, which is simply the difference in the growth rates of electricity consumption and GDP growth, reflected that the informal economy is 21.6% of the GDP.

Gulzar, Junaid, and Haider (2010) used five different approaches for estimating the informal economy. In addition to the three mentioned in Arby, Malik, and Hanif (2010), Tanzi's Approach and the Labour Market Approach were also taken into account. Different approaches provided different results with visible variation indicating that estimation of the informal economy is sensitive to the choice of the theoretical and empirical approach.

Ramzan (2013) also used the Tanzi (1980) approach for measuring the determinants and size of the informal economy of Pakistan. Their analysis provides staggering estimates of the size of the informal economy of Pakistan, i.e., around 80% of the GDP. Keeping in view the wide range of estimates from various papers incorporating numerous estimation techniques, it can be deduced that the estimates of the size of the informal economy largely depends on the methodology used for estimation.

Ashraf and Kemal (2019) used Tanzi (1980) with few modifications for estimating the extent of the informal economy. After estimation, the study analyzed the determinants of the informal economy and how each determinant is related to it. Over the various determinants highlighted, the study found nine determinants to have a significant relationship with the informal economy. *Political rights*, *Capital Controls*, and *Rural Population* were found to negatively impact the informal economy. On the other hand, factors including the *Political Terror Scale*, *Black Market Exchange Rate*, *Capital Control and Movement of People*, *Urban Population*, *Age Dependency Ratio*, and *Tax per GNP* were found to positively influence the degree of the informal economy of Pakistan.

After reviewing the related methodology used for measuring FD and the informal economy, the study now shifts its discussion toward several empirical studies that have analyzed the relationship between the two aspects. Largely, a general consensus exists among scholars that FD does effectively reduce the size of the informal economy. Several important studies building this consensus have been discussed in the subsequent parts of this chapter.

Bose et al., (2012) utilized panel data consisting of 137 countries to assess the significance of the development of the banking sector on the size of the informal economy. Two indicators were used to capture the depth dimension, whereas, six indicators were included to gauge the efficiency dimension. The study deployed two measures for estimating the size of the informal economy. The estimates from the Global Competitiveness Report published by World Economic Forum were used for cross-sectional analysis, and the dynamic MIMIC approach provided by Schneider

(2007) was used for panel data analysis. Using basic OLS, the study found both indicators of depth to be significant across both measures of the informal economy. On the other hand, four indicators of banking sector efficiency were found to be significant. To capture the aggregate effect of these indicators, the study uses Principal Component Analysis (PCA) and concludes that overall banking sector development is important for restricting the size of the informal economy. Another important finding worth mentioning is that financial development plays a more significant role in low-income and middle-income countries, these groups of countries are characterized by larger informal economies and lower financial development.

Capasso and Jappelli (2013) carried out a cross-section analysis by using microdata from 8,000 households in Italy. Instead of relying on indirect approaches, that are based on macroeconomic estimates, the study uses microdata for measuring the informal economy. The reason for disregarding the indirect estimates is that they have two limitations. First of all, these estimates are prone to large measurement errors. Secondly, the indirect estimates of the informal economy have a strong correlation with other macroeconomic variables. To overcome these issues, the study constructs two estimates of the informal economy using microeconomic data. The first estimate measures the informal economy by using irregular working activities, whereas, the second estimate calculates the fraction of income received in cash. Using the local indicators of financial development proposed by Guiso et al. (2004), measured in terms of the probability of households having access to credit, the study conducts an empirical analysis through OLS regression for empirical analysis. The results are

consistent across the two measures of the informal economy, such that, an increase in financial development by 10 percentage points reduces the informal job rate (informal economy) by 2.2 percentage points. Furthermore, a control variable of judicial efficiency was also found to have a significant role, such that, the irregular working rate is higher where there is lower judicial efficiency.

Elgin and Uras (2013) studied whether the presence of an informal economy harms the development of the financial sector by using a panel dataset of 152 countries for the period 199-2007. Estimates of the shadow economy were extracted from Schneider et al. (2010) which measures the same through the dynamic MIMIC approach for the period of 1997 to 2017. Private sector credit as a percentage of GDP, from World Development Indicators (WDI), was used as a proxy for measuring financial development. With the help of a fixed-effect and GMM estimator, the study acknowledged the presence of a U-shaped relationship as two channels were identified through which informal economy size can affect the financial sector depth. The first channel identifies and recognized that the informal economy can be harmful to financial development by raising financial repression. The second channel identifies a positive impact of the informal economy on financial development by improving the efficiency of the financial sector.

Berdiev and Saunoris (2016) examined the relationship by using a panel vector auto-regression (VAR) model of 161 countries over the time frame of 1960 to 2009. For measuring the shadow economy, the study of the strategy was put forth by Elgin and Oztunali (2012). For financial development, the study uses Elgin and Uras (2013) who propose to capture financial development through three distinct measures. With

the help of the Generalized Method of Moments (GMM) estimation technique, their empirical results reveal that financial development does have a significant and negative impact on the informal economy. A one-standard deviation shock to money and quasi-money (financial development) reduces the informal economy by 0.06 percent. The study also uses two other measures as an alternate for financial development and finds consistent and significant results. PCA is also used to merge the three variables of financial development into one measure. Although the results are found to be in line with the baseline results, however, the effect of the single measure is more pronounced. As highlighted by Bose et al. (2012), the study also finds financial development to be more significant in low-financial development countries in terms of reducing the size of the informal economy. Interestingly, the concerned study also identified the presence of reverse causality, i.e., a shock to the informal economy was found to impede the financial sector development only in highly financially developed countries.

Liu-Evans and Mitra (2019) gave special emphasis to the stability dimension of the financial sector and analyzed its interaction with the informal economy size. The study develops panel data from 60 countries to analyze the significance of bank stability (measured by bank z-scores) on the INF (Schneider et al., 2016). Using OLS estimation, the study found that the stability of the banking system has a robust and significant impact on the size of the informal economy. Furthermore, sub-samples of countries were also developed on the basis of the level of financial development measured in terms of private sector credit as a percentage of GDP. The results revealed that banking stability has a relatively strong negative relationship with the

informal economy size for that sub-sample of countries where financial development is higher. Conversely, for countries where the financial development level is comparatively lower, banking system stability is found to have an insignificant role in the entrepreneur's decision whether to join the informal or the formal sector. One of the possible reasons is that banks operating in a lower financially developed environment tend to hold more amount of capital and disburse lower credit. This limits the incentive of small businesses operating in the informal economy to leave the informal economy due to the lack of availability of credit from formal banks. The findings of this study hold relevance to Pakistan as it is among those groups of countries with a lower level of financial development (see Appendix A).

Omri (2020) assessed the role of governance quality on informal and formal entrepreneurship through financial sector development. Formal entrepreneurship is reflected by the number of newly registered businesses as a percentage of the working-age population, whereas, informal entrepreneurship is the number of unregistered businesses as a percentage of the working-age population. Financial development is measured as private sector credit as a percentage of GDP, and quality of governance is measured by size indicators of governance from World Governance Indicators. To address the objectives of the study, the author uses GMM estimation on panel data of 19 EMDEs for the period from 2001 to 2014. The study finds financial development to have a significant positive impact on formal entrepreneurship and a negative effect on informal entrepreneurship. Improvement in the quality of governance was found to promote formal entrepreneurship and restrict informal entrepreneurship. Moreover, the interaction between the quality of

governance and financial development was also found to be positive. Hence, this indicates that the quality of governance can be used as a policy tool to strengthen the relationship between financial development and formal and informal entrepreneurship.

Katircioglu and Imamoglu (2020) investigated the role of financial development on the INF of Turkey by employing annual time-series data for the period 1970 to 2017. The data for the informal economy was extracted from Imamoglu (2020). For financial development, five indicators of financial depth from the World Bank (2017) were used to develop a composite index of financial development via PCA. Two approaches were used to estimate the long-run relationship between financial development and the informal economy, including, fully modified ordinary least squares and dynamic ordinary least squares. Their results confirmed the existence of a U-shaped relationship between FD and the informal economy, such that, informality tends to rise with FD at early stages but declines over an extended period of time. Apart from FD, the study also emphasized institutional quality and quality of governance to have a negative spillover effect on the informal economy.

Canh and Thanh (2020) took a multi-dimensional approach toward financial development by using the estimates provided by Svirydzenka (2016) and examined its role in the shadow economies (Medina and Schneider, 2018) of 114 countries for the period 2002 to 2015. In addition to overall financial development, the study also investigated the role of financial development across the three dimensions (financial access, financial depth, and financial efficiency) in two sub-sectors (financial markets and financial institutions) of the informal economy. All indicators of financial

development were found to reduce the informal economy. As compared to financial markets, financial institutions, especially, in terms of their efficiency were found to be more significant in reducing the informal economy. Using the Autoregressive Distributive Lag (ARDL) model, the study used dynamic fixed effects estimator (DFE) to determine the short-run and long relationship. The results indicated a positive effect of financial depth and financial access on the informal economy during the short run, on the other hand, financial institutions were found to have a negative effect in the long run.

Imamoglu (2021) investigated the relationship between financial sector development and trade openness on the size of the underground economy for a group of 15 member countries of the European Union countries for the period 2004 to 2017. Apart from analyzing the relationship between the concerned variables, the study aimed at determining whether financial development and trade openness can assist the EU member countries in meeting the Europe 2020 strategy. The study incorporated the study of Medina and Schneider (2019) for the data on the underground economy. Medina and Schneider (2019) provide estimates of the underground economy of 157 countries through the MIMIC approach. The financial development of sample countries is in an index form extracted from the International Monetary Fund (IMF) database, whereas, data on trade openness is attained from the World Bank's World Development Indicators (WDI, 2016). By applying OLS estimation, the analyses revealed that financial development and trade openness have a negative and statistically significant relationship with the underground economy of EU member countries. The study urges the authorities of EU countries to pay attention to financial

development as it has the ability to remove the obstacles in fulfilling the growth objectives of the Europe 2020 strategy.

Hajilee and Niroomand (2021) investigated the role of financial depth on INF. The study developed panel data of 17 EMDEs (including Pakistan) for the period of 1980 to 2018 and examined the short-run and long-run relationship between the two variables through the ARDL estimation approach. The study follows the strategy proposed by Hajilee et al., (2017) to measure the size of the shadow economy by computing the ratio between the labor force participation rate and the working-age population (age 16 to 64). Financial development, on the other hand, is measured by the ratio between private sector credit to GDP. The findings of the study show that the presence of the shadow economy can have an adverse significant impact on the level of financial depth. This implies that in the presence of the shadow economy the opportunity for having higher financial deepening and a well-developed financial sector is less likely in EMDEs. However, the study identifies that the impact of the shadow economy on financial depth is not symmetric across the sample of countries. Country-specific factors at the economic, political, and social levels were identified as the main cause of heterogeneity across the countries. With special emphasis on Pakistan, the lag periods of the shadow economy were found to have an insignificant impact on the financial sector depth during the short run. But, the long-run estimates identified a negative and significant relationship between the shadow economy and the depth of the financial sector.

The introduction of mobile financial services (MFS) is a noteworthy development made in the financial sector globally. Apart from providing payment and money

transfer services, currently, the MFS is providing credit facilities and insurance services in numerous countries. Jacolin et al. (2019) gave special emphasis on the MFS and investigated its influence on the informal economy. The study utilized panel data comprising 81 EMDEs for the period of 2000-15. The indicator of MFS is a dummy variable that takes a value of "1" from the year since its launch and "0" otherwise. Estimates of the informal economy are attained by Medina and Schneider (2018) for the informal economy. Using the fixed effect model the study finds MFS to significantly decrease INF in between 2.4 - 4.3 percent of the GDP. Apart from analyzing the role of MFS adoption in the informal economy, the study also analyzed the transmission channels that influence the adoption of MFS. For this purpose, the study develops a logit model where MFS adoption is treated as a dependent variable. Relying on the literature (Aron, 2018; Della Peruta, 2018; Naghavi et al., 2016; Mothobi and Grzybowski, 2017), the study identified ten variables that may influence MFS adoption. Using the propensity score matching technique, the results identified urban population growth, labor force, social globalization, rule of law, investment freedom, financial development, income level, and share of the mobile phone market to be the main drivers of MFS adoption.

Syed et al., (2021) emphasized and studied the significance of digital finance on financial instability and shadow economy for a group of South Asian countries. The study develops two models where the first model hypothesizes a negative impact of digital finance on the size of the shadow economy, and the second hypothesis claims a positive relationship between digital finance and financial instability. Digital finance was measured by two variables, including, mobile money transactions as a

percentage of GDP and the number of ATMs per 100,000 adults. Schneider et al., (2018) were used for drawing estimates of the shadow economy for the sample of countries. Finally, for the financial stability proxy, the non-performing loans ratio (NPLs) and bank credit to deposit ratio were used from the IMF's financial statistic database. The study found that digitization effectively reduces the size of the shadow economy among South Asian countries. Thus, the study calls for fintech innovation and other digital forms of financial sector outreach in order to further curb the growth of the shadow economy. While estimating the impact of digitization on financial instability, the study identified excessive digitization raises financial sector instability. The study postulated that increased use of digital modes of transaction increases the individual's spending rate. As a result, to keep up with the spending requirements individuals increasingly resort to bank credit which, in turn, raises the number of non-performing loans and credit to deposit ratio of the banking sector.

2.2 Theoretical Background

The theoretical grounding between financial development and the informal economy has been established by numerous studies (Straub, 2005; Blackburn et al., 2012; Elgin and Uras, 2013; Cappasso and Jappelli, 2013). Theoretically, Becker's (1968) study of economics and criminal justice established the link between FD and the informal economy. In that study, it was argued that an individual evaluates the benefits of illegal action against the cost of detection. In the same vein, an individual/firm also assesses the benefits of behaving informally (e.g. by avoiding burdensome regulations and taxes) against the opportunity cost (forgone access to formal financial services) and direct cost (monetary cost against apprehension). A graphical illustration of the

choice faced by an individual/entrepreneur between formal and informal economy is shown below:

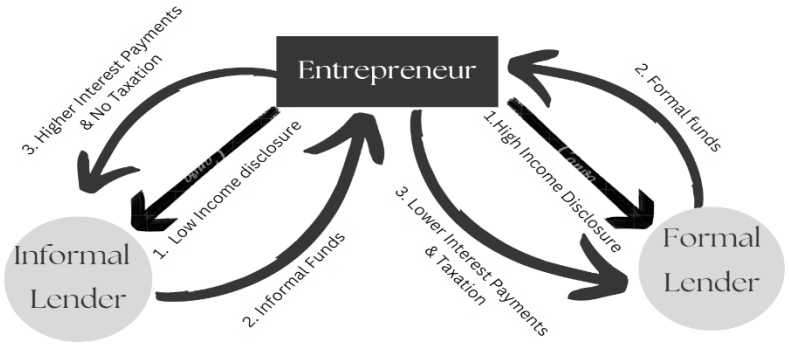


Figure 2.1*:* Theoretical Illustration

Straub (2005) is one of the notable contributions in this aspect. In that study, a theory-based model was developed where entrepreneurs assess the advantages and disadvantages of operating in formal and informal economies. The advantages of operating in the formal sector allow the use of public goods, especially financial institutions. While financial institutions provide greater access to credit to entrepreneurs, Straub (2005) argues that entrepreneurs have to bear considerable cost (e.g. registration cost) if they opt for operating in the formal economy. The model suggested that for accessing the services of the financial sector, entrepreneurs pledge a "minimum level of initial assets" as collateral. On the flip side, entrepreneurs who are not able to meet this level continue to function in the informal economy "as the combination of costly registration costs and credit rationing makes the formal credit

market unattractive to them (Straub, 2005; 310)". Subsequently, Straub (2005: 315) suggested that at a given minimum level of initial assets where entrepreneurs would find it fruitful for operating in the official economy for accessing the credit markets is "increasing in the entry cost", "decreasing in the interest rate differential between the formal and informal credit markets", "decreasing in the quality of legal enforcement of creditor's rights", "decreasing in the stability of the environment", and "ambiguously related to the level of taxation".

In line with Straub (2005), numerous other studies have also pointed out the effect of credit market conditions in determining the extent of the informal economy (Dabla-Norris and Feltenstein, 2005; Antunes and Cavalcanti, 2007; Quintin, 2008; Blackburn et al., 2012; Capasso and Jappelli, 2013). For example, Dabla-Norris and Feltenstein (2005) developed a dynamic general equilibrium model in order to estimate the role of taxes on macroeconomic variables, including the informal economy. The findings of the model indicated that under imperfect credit market conditions, raising corporate taxes on a particular sector may induce firms to go underground. As a result, the amount of collateral in the formal sector may drop, resulting in a reduction in the number of loans and investments in that area.

Blackburn et al., (2012) question some of the theoretical literature regarding the strict assumption made on the individual's/entrepreneur's choice between informal and formal sector participation (Straub, 2005; Antune and Cavalcanti, 2007; Quintin, 2008). The assumption under scrutiny suggests that individuals/entrepreneurs participate either in the informal or formal sector. While departing from this assumption, the study also moves away from the idea that individuals have to forego

all the benefits of the formal sector while operating informally. Instead, the study argues that individuals can take part in the informal economy by under-reporting their income (for tax evasion) while conducting formal business activities. With this assumption, the central idea of the study is to investigate how financial market conditions affect the individual's preference for going underground. For instance, under imperfect financial market conditions (information asymmetry), the amount of income revealed by individuals affects the terms and conditions of the loans offered by financial institutions. Simultaneously, if the financial market conditions improve, as reflected by the lower cost of financial intermediation, the marginal benefit for disclosing income increases. Thus, as the financial sector moves from a low to an intermediate, and finally to high development regime, then the portion of tax-evading individuals also declines as they find it more beneficial to be a part of the official economy.

Capasso and Jappelli (2013) is another contribution in this regard that theoretically explained the trade-off between informal activity and financial development. The study developed a simple theoretical model where an agent decides whether to be a part of the informal economy (low-return technology) or the formal economy (high-return technology). Investing in low-return technology does not require a loan, whereas, investing in high-return technology requires a loan. If an agent decides to invest in high-return technology, then collateral must be pledged against the loan (external finance). Although pledging more collateral would allow a reduction in the cost of credit, nonetheless, it would also lead to higher taxable income as the agents are disclosing more of their financial information to financial intermediaries and tax

officials. Thus, while deciding between the two technologies, an agent assesses the trade-off between reduced financial cost against the benefit of hiding revenues. Based on their model, the study hypothesized and proved that as the financial sector develops the cost of credit reduces, thereby, reducing the incentive for operating in the informal economy.

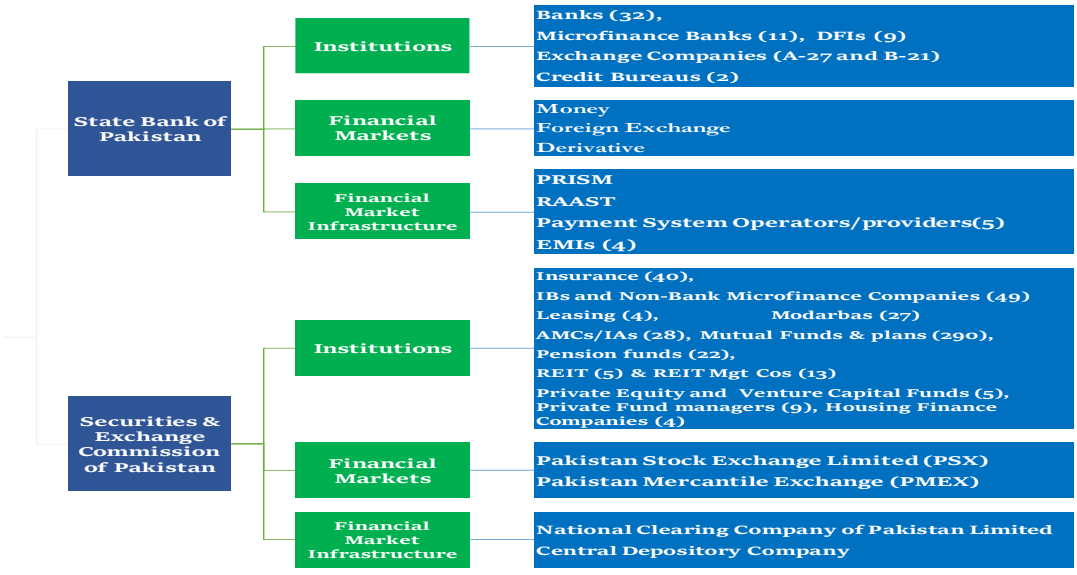
Both streams of the literature have documented that financial development is one of the sources that may undermine informal activity in any jurisdiction. Although in high-income countries the role of financial development is not so significant, conversely, in low and middle-income countries it plays a more substantial role. Nevertheless, there are some shortcomings in the literature that needs to be addressed. First of all, as highlighted by Svirydzenka (2016), most of the literature has only reflected financial development in terms of two measures of financial depth. Canh and Thanh (2020) are an exception in this regard as they took a broader definition of financial development by explicitly including three-dimension (access, depth, and efficiency). Still, it leaves out one important area and that is the stability dimension. For instance, excessive sub-standard lending by financial institutions would exhibit strong financial deepening and improved access to finance. Moreover, loan approvals with less scrutiny would lower loan application costs and improve the efficiency of the financial sector. But without an appropriate risk management mechanism, the financial system would be unstable and eventually initiate a financial crisis that could ultimately adversely affect the real economy. As a result, a developed financial sector requires stability by placing effective risk management tools in place.

Another aspect that the current literature does not fully address is the influence of the fintech industry on the informal economy and compares its significance with respect to traditional branch-based financial services. Jacolin et al. (2019) are one of the relevant studies in this regard that captures the role of fintech by analyzing the effect of mobile financial services, the basic form of fintech, on the informal economy.

CHAPTER 3

OVERVIEW OF THE FINANCIAL SECTOR OF PAKISTAN

The financial sector of Pakistan is regulated by two regulators, namely, the State Bank of Pakistan (SBP) and the Securities and Exchange Commission of Pakistan (SECP). Being the central bank of Pakistan, SBP regulates all the deposit-taking entities in Pakistan which includes commercial banks, development finance institutions (DFIs), and Microfinance Banks. On the other hand, SECP regulates other non-banking financial institutions (NBFIs) and the non-financial sector. Figure 3.1 provides an overview of the financial sector infrastructure along with their corresponding regulatory authorities. The numbers in parentheses reflect the number of institutions against each sub-sector.



Source: SECP and SBP

Figure 3.1: Financial Sector Infrastructure of Pakistan

3.1 The Banking Sector

By end of 2021, the financial sector of Pakistan holds an asset size of PKR 39.2 trillion equivalent to almost 64% of the GDP (**see table 3.1**). Banks are the most dominant player in the financial sector with an asset size of PKR 30 trillion and holding 76.6% of the financial sector assets. The total number of banks in Pakistan is 32 out of which 20 are local private banks, 5 banks are public sector commercial banks, 4 banks are foreign banks, and 3 banks are specialized banks.[8]

Table 3.1: Asset Composition of the Banking Sector

PKR Billion	**2018**	**2019**	**2020**	**2021**
MFBs	328	380	494	582
DFIs	238	377	439	539
NBFIs	1,185	1,339	1,700	2,023
Insurance	1,472	1,693	1,931	2,143
CDNS	3,654	3,998	4,248	3,884
Banks	19,682	21,991	25,124	30,058
Total	**26,559**	**29,778**	**33,935**	**39,230**
Percentage Share in Total Assets				
MFBs	1.2	1.3	1.5	1.5
DFIs	0.9	1.3	1.3	1.4
NBFIs	4.5	4.5	5.0	5.2
Insurance	5.5	5.7	5.7	5.5
CDNS	13.8	13.4	12.5	9.9
Banks	74.1	73.9	74.0	76.6
Assets as a Percentage of GDP				
MFBs	0.8	0.8	1.0	0.9
DFIs	0.6	0.8	0.9	0.9
NBFIs	2.9	2.9	3.3	3.3
Insurance	3.5	3.7	3.7	3.5
CDNS	8.8	8.8	8.2	6.3
Banks	47.4	48.2	48.6	49.0
Overall Assets	**64.0**	**65.2**	**65.7**	**63.9**

Source: SBP

[8] Financial Soundness Indicators and Quarterly Compendium of the Banking Sector

Like many other developing countries, the financial sector of Pakistan is dominated by the banking sector.[9] As a result, a dominant banking sector can have several potential drawbacks and advantages. Speaking about the drawbacks first, one of the major issues is that the level of competition tends to be limited in the financial sector. This could further lead to higher fees for accessing financial services, but also lower access to financial services, particularly to lower-income and underserved communities. The lower competition also compels the banking sector to venture less into risky and innovative activities which, in turn, could restrict the development of new financial products and services. A higher role of the banks in the financial sector also raises the concern for systemic risks. This is because the failure of a few large banks could have an adversely significant impact on the financial system and the real economy as well. Lastly, the potential for regulatory capture also increases in such situations where banks are the dominant player. The regulatory capture could lead to regulatory decisions that are influenced by the banks and not necessarily capture the interest of consumers or the wider economy.

On the contrary, there are also some potential benefits of having a financial sector that is heavily dominated by banks. For instance, banks are heavily regulated entities with strict risk management practices that contribute to the stability of the financial sector. A large banking sector also raises the scope of financial intermediation which is also their primary function. This allows the flow of capital from depositors to borrowers which can also accelerate economic activity. In addition, the banking

[9] https://www.elibrary.imf.org/display/book/9781557755025/C2.xml#container-102684-item-102660

sector is also a key lender to the government which can support infrastructure development, hence, further lifting economic growth.

3.2 Mobile Financial Services

The path for mobile financial services (MFS) in Pakistan was legalized by the State Bank of Pakistan under the "*Branchless Banking Regulations*" in September 2009. The first MFS to be formed under this regulation was *Easypaisa* in October 2009 by Telenor Pakistan. Being the first of its kind, Easypaisa first started its operation by facilitating utility bills payment, mobile transfers, and mobile phone credit top up. However, over the years the scope of Easypaisa evolved significantly as it now offers a wide range of additional services, including, bank account opening and management, insurance, loans, and e-Commerce.

Following Telenor's Easypaisa, Mobilink Jazz also entered as an MFS provider with the introduction of *JazzCash* in 2012. JazzCash started its operations by providing basic MFS such as mobile money transfers, mobile payments, and mobile money transfers. To meet the changing demands and needs of the customers, JazzCash introduced various features in its operations and established itself beyond just a mobile banking provider. First of all, Jazzcash partnered with several banks in Pakistan in order to expand its customer by providing services through their branches. Secondly, JazzCash also enables bank account opening through its app. Lastly, another customer-friendly feature is that a single JazzCash account can be linked with other multiple bank accounts.

Other commercial banks that, standalone or in collaboration with other entities, initiated MFS includes Askari Bank, Bank Alfalah, Habib Bank, MCB Bank, Meezan Bank, Standard Chartered Bank, UBL, and U Microfinance Bank. Apart from the banks, there are also other Fintech-based companies that are offering MFS but are regulated by the Securities and Exchange Commission of Pakistan. As a result of these market players, the number of mobile accounts in Pakistan has increased considerably (**see Appendix B).**

3.2.1 Fintech Opportunities

There is around 40 prominent Fintech operating in Pakistan offering numerous services like payment service providers, payment independent software vendors, merchant aggregators, digital credit/saving, wallet services, insurance tech, and identity services. Amongst these services, payment services have matured quickly after receiving much attention from the Fintech sector. Within the payment space, Fintechs in Pakistan has already tapped areas such as supply chain payments, over-the-counter (OTC) retail payments, merchant payments, and international remittances. However, Fintech-based solution for direct debit, tax payments, and account pooling is less explored and provides an opportunity to expand payment services.

Fintech services for savings, investments, insurance and lending are limited. For promoting savings and investment, crowdfunding platforms are required to enable informal funds to an alternative regime for accessing finance. Moreover, the digitization of rotating savings and credit associations (ROSCA) also provides an

opportunity to promote savings through formal investment platforms rather than informal saving committees.

3.2.2 Fintech Challenges

Despite the opportunities available for reaching the underserved population, there are considerable challenges for Fintech innovation that requires attention for these opportunities to be materialized. First of all non-targeting, the underserved market has adversely affected the pace of financial inclusion in Pakistan. This is evident from the fact that over the course of 5 years hundreds of start-ups are formed and only a handful of them are Fintech firms. Out of these limited Fintechs, a further smaller fraction is focusing to cater the needs of the underserved segment of the population. The reason for this limited outreach is because of innovation efforts are largely focused on improving the provision of existing financial services rather than new product development.

Over-regulation of this market is another challenge dealt with by this sector. This is because regulators are more focused on consumer protection in order to strengthen the trust of the customers in the financial system. Whereas, for financial service innovation regulators have been very cautious.

Lack of financial literacy is another impediment to the swift adoption of the services offered by Fintechs. This feeds into a trust deficit and inhibits individuals as well as businesses from adopting digital modes of financial services. Preference for cash may be due to a lack of adequate infrastructure of financial services, personal preferences, and adverse experiences. Regardless of what the reasons are, it is considerably impacting Fintech to serve the underserved population.

There are also considerable barriers for Fintechs to partner with financial institutions. The reason is that most of the Fintech start-ups do not have a license and a tested business model. Since banks in Pakistan are known for their risk aversion they show reluctance towards partnering with most of the Fintechs.

CHAPTER 4

QUALITATIVE ANALYSIS

The current chapter first seeks to address the perspective of the financial sector policymakers with reference to the research questions involved in the study. The feedback of the policymakers was attained through an online questionnaire, and a total of 20 responses were documented. The purpose of the questionnaire was to compare whether the results are in line with the findings of the empirical analysis conducted in chapter 5 of this document. Afterward, the study discusses the policy measures promulgated by the regulatory authorities for the development of the financial sector. Numerous measures are categorically discussed against each aspect of financial development.

4.1 Survey Results

Almost all of the respondents agreed to the fact that the informal economy is one of the major issues faced by Pakistan's economy (**see Appendix C**). While probing the reasons for the existence of an informal economy, 30% of the respondents identified a "lack of access to financial services" as the key driver of informal activity. Other factors, including, "tax burden", "lack of business freedom", and "corruption" gained equal responses of 20% each. When the respondents were specifically asked about the importance of FD in reducing informal activity, all of them agreed that it does have a strong bearing on the informal economy. Thereby, justifying the importance of the study at hand.

In response to the importance of the dimensions of FD, the majority of the respondents agreed that financial access, financial depth, financial efficiency, and financial stability does have a strong say in shaping the informal economy. Conversely, in relative terms, financial efficiency received a strong approval of 95% in affecting the size of the informal economy. This was followed by financial access and financial stability with 80% each, whereas, financial depth received a relatively lower response of 70%.

To gain feedback regarding the research question "What is the perception of the financial regulators regarding the role of FD in the INF of Pakistan?" of the study, the respondents were asked about the relative importance of the banking sector and fintech sector (Mobile financial services) in effectively reducing the informal economy of Pakistan. In response, 95% of the participants agreed that the fintech sector will play a relatively more significant role as compared to the banking sector in restricting the informal economy.

While conducting general discussion with the respondents, majority of them highlighted the need to improve financial literacy in Pakistan in order to make financial sector reforms successful. While financial literacy was argued to allow individuals/businesses in making better financial decision such as credit, saving, risk management, and future financial planning, but the respondents also emphasized on the fact that it raises trust and understanding on the decisions made by the financial regulators. After that, the respondents stressed on the need to further improve access to financial services which was considered to be daunting task as financial access is

required largely in rural areas where infrastructure (communication and transportation) is lacking.

As far as credit rerforms are concerned, the focus is primarily on the individual/businesses who are already part of the formal sector. The main objective of credit reforms is to improve SME financing and agriculture financing to the formal businesses. However, the respondents cited that credit reforms needs to be accompanied with improvement in judicial proceedings for non-performing loans, low interest rates, extensive borrowing history, and improved risk management tools. Thus, credit reforms were considered relatively less effective in reducing informal economy alone.

As far as reforms pertaining to financial stability is concerned, respondents believed that the concept is not a common knowledge among the local population. The reason is that, according to their experience, people always confust economic stability with financial stability which are two different concepts. Bringing financial stability cocerns into knowledge among the local population was regarded as a long-term exercise. Thus, reforms in relation to financial stability are said to only improve the resilience of the financial sector in line with international standards, and it was said to have lesser role than any other dimension of financial development that has the capacity to encourage informal activities into formal economy.

The purpose of this analysis was not only to reflect upon the perception of the financial sector regulators but also to validate whether their perceptions are aligned with the empirical findings of the study. Overall, the results of the qualitative work reveal that the policymakers realize the informal economy as one of the major issues

in Pakistan's economy. Secondly, the impact of FD has received an overwhelming response which, hence, validates the purpose of the study. Lastly, the fintech sector has also received considerable attention which supports our choice of analyzing the role of MFS on the informal economy.

4.2 Overview of Policy Measures

One of the major policy reforms in the history of the financial sector of Pakistan was the initiation of financial sector liberalization during the 1990s. The purpose of this reform was to undo the adverse effects of the Financial Sector Nationalization of 1974 and improve the balance sheet position of the banking sector. As a result, the financial health of the banking sector improved as highlighted by SBP's annual report "Banking Sector Review – 2003". According to the report, the solvency of the banking sector improved and reduced the concerns of systemic risk. Asset quality had also improved significantly as the infection ratio was brought down to a single digit by the early 2000s.[10] At last, the profitability had also improved as the banking sector was able to lift itself from a loss-making industry to a profitable one.

Having briefly discussed the effect of financial sector liberalization, the current study largely focuses on the policy measures aimed at developing the financial sector of Pakistan. Various policy measures against each area of financial development are highlighted and discussed in the remaining parts of this chapter.

[10] Infection ratio is the ratio between non-performing loans and total loans, this indicator also measures the asset quality of the banking sector.

4.2.1 Financial Access

One of the major reforms aimed at improving access to financial services was the introduction of policies for promoting Islamic Banking in Pakistan by SBP in 2003.[11] Under this policy, SBP encouraged the development of a full-fledged privately owned Islamic bank. Moreover, SBP also encouraged the existing commercial banks to set up subsidiaries for Islamic Banking operations. The purpose of this reform was to accommodate the fraction of the population who desired for Islamic mode of financing. The first full-fledged Islamic Bank was established in 2005, nonetheless, currently, there are 5 Islamic banks and 17 conventional banks having Islamic Bank Branches. At present, the Islamic Banking sector accounts for almost 20 percent of the total banking sector deposits.[12]

To address the challenges of financial inclusion, SBP along with the government of Pakistan adopted the National Financial Inclusion Strategy (NFIS) in May – 2015. Under this strategy, SBP and GoP focused on raising financial awareness among poor people. In order to facilitate low-income households, the action plan also included the provision of Mobile wallets and easy accounts to expand access to financial services. Increasing access points of financial services through branch expansion, ATMs, and PoS machines was also part of the concerned strategy. Furthermore, building the capacity of the banks to provide loans to small and medium businesses was also a major ingredient of the NFIS. Since its inception, financial inclusion in Pakistan has

[11] Banking Policy Department Circular No. 1 – January 1, 2003
[12] Quarterly Compendium and Financial Soundness Indicators of the Banking Sector – March, 2020

risen from 9.0 percent in 2015 to 21.0 percent in 2020, nonetheless, the achieved level is well below the target level of 50.0 percent.

On 3rd January 2022, SBP announced instructions pertaining to licensing and regulatory framework for digital banks in Pakistan. The primary objective of this policy measure is to further strengthen financial inclusion, expand the digital ecosystem, provide cost-effective means for accessing financial services, and raise customer convenience. This measure received positive feedback from the market as SBP received 20 applications seeking approval for establishing digital banks in Pakistan.

4.2.2 Financial Depth

To ensure the disbursement of credit to the agriculture and SME sector, SBP developed the Microfinance Institutions Ordinance in 2001. This ordinance grants SBP the authority to provide a license for the establishment of a microfinance bank. Through these institutions, SBP aims to further promote financial inclusion and alleviate poverty by providing small loans to the aforementioned sectors. SBP has developed separate prudential regulations and credit schemes for agriculture and SME financing. For instance, for promoting agriculture finance, SBP provides Crop Loan Insurance Scheme, Warehouse Receipt Financing, Value Chain Financing and etc. On the other hand, for SME financing SBP has formulated refinance schemes and credit guarantee schemes.

SBP also gave special attention to improving consumer financing, especially, mortgage financing in Pakistan. One of the notable measures undertaken in this

regard is the development of the Pakistan Mortgage Refinance Company (PMRC) in June 2018. The primary focus of the company is to provide liquidity to the Primary Mortgage Lenders in order to expand mortgage financing in Pakistan. In the same vein, SBP also introduced mandatory credit targets to the banking sector for promoting housing and construction finance.[13] According to the circular floated by the SBP, each bank needs to ensure that at least 5 percent of their domestic credit to the private sector is provided for housing and construction financing.

Pakistan's economy experiences rapid shifts in its policy rate due to economic uncertainty. Shifts in policy rates create rollover risk for those borrowers availing of long-term financing from the financial sector. To mitigate the impact of rollover risk, SBP issued a circular notifying that the *Export Refinance Scheme (EFS)* and *Long Term Financing Facility (LTFF)* are to be linked with the policy rate. This measure is likely to encourage borrowers to avail of long-term financing in the wake of lower rollover risk.[14]

To facilitate the banking sector for providing credit to the private sector SBP, under the Credit Bureau Act (2015), issued licensing criteria for the development of credit bureaus in Pakistan. The purpose of establishing credit bureaus was to assist the banking sector in providing loans to credit-worthy borrowers through its prime functions, including, (i) Credit scoring; (ii) Portfolio monitoring services; (iii) Debt collection services; (iv) Fraud detection; and (v) Marketing services.[15]

[13] IH&SMEFD Circular No. 10, 2020
[14] State Bank of Pakistan, IH&SMEFD Circular No. 11 of 2022
[15] https://www.sbp.org.pk/cpd/pdf/FAQs/Private-Credit-Bureaus.pdf

SECP introduced the Secured Transaction Registry (STR) to facilitate financial services to unincorporated entities. The registry allows SECP to register interest charges created by the entities against their immovable properties. For instance, borrowers from SME and agriculture sectors can secure credit from financial institutions against immovable assets, including, agriculture produce, intellectual property, receivables, inventory, motor vehicles, petroleum or minerals, etc.

4.2.3 Financial Stability

To promote the financial stability regime in Pakistan, SBP developed the Financial Stability Department with the aim to monitor and address the rising vulnerabilities in the financial sector.[16] The department publishes two flagship reports, namely, the *Mid-Year Performance Review of the Banking Sector* and the *Financial Stability Review* on an annual basis that discusses the performance and soundness of the financial sector of Pakistan.

To ensure a stable financial system, SBP also introduced a minimum capital regulatory requirement on the banking sector as defined by the Basel Committee of Banking Supervision. Currently, SBP has directed the banks to maintain eligible capital that is at least 11.5 percent of the risk-weighted assets. This requirement is above international standards, that is, 10 percent capital of the risk-weighted assets.

The Financial Stability Board (FSB) along with the Bank for International Settlement (BIS) identified several international banks that are deemed to be "*Too Big to Fail*". These banks are referred to as Global Systemically Important Banks (GSIBs) because

[16] State Bank of Pakistan, FSD Circular No. 1 – 2016

their failure could trigger a financial crisis globally. In the same vein, SBP has also identified several banks in Pakistan that could trigger a crisis in Pakistan's economy. Based on the criteria prescribed by the SBP, three banks were identified and they are referred to as Domestic Systemically Important Banks (DSIBs).[17] Under this regulation, the designated banks are subject to higher loss absorbency capital requirements and enhanced supervision.

Another important development made by the SBP for ensuring the stability of the financial system was the development of the Deposit Protection Corporation (DPC) in 2016. The rationale for developing DPC was to safeguard the interest of the depositors in the event of bank failure. According to the introduced scheme, each bank is designated to provide deposit coverage of Rs. 250,000 per depositor which is equivalent to 1.39 times GDP per capita.

In line with international best practices, SBP and SECP signed a letter of understanding (LoU) for the establishment of the Council of Regulators in 2017. The objective of this agreement is to hold periodic meetings between the two financial regulators for managing systemic risk and strengthening the stability of the financial system.

4.2.4 FINTECH Sector

To promote start-up companies and innovation in the financial sector, SECP introduced its "*Regulatory Sandbox*" in 2019. The purpose of the sandbox is to provide companies with a controlled environment comprised of a tailored regulatory

[17] State Bank of Pakistan, BPRD Circular No. 04, 2018

setting and a limited scale for testing the viability and marketability of innovative products, services, or processes. This initiative received a positive response as SECP received numerous applications seeking approval to be a part of the first cohort of the Regulatory Sandbox. Against the application received, SECP approved six solutions in the first cohort.

4.3 Evaluation of Policy Measures

The financial regulators have proactively introduced policies to improve and develop the financial sector of Pakistan. The above-mentioned policy measures encompass all four dimensions of financial development as highlighted in the current study. Owing to these efforts, the regulators have been successful to some extent to promote financial development, but there are some shortcomings that need to be highlighted to accelerate the pace of financial development. For instance, the pace at which financial inclusion has been increasing in Pakistan is relatively slow. According to the World Bank's Global Findex, financial inclusion has only risen from 10% in 2011 to 21% in 2021 which is relatively very slow with respect to other comparable economies (**see Appendix K**). One of the major issues which the government policies have overlooked is gaining the trust of the local population in the financial institutions. According to the Gallup World Poll 2017, more than one-third of the adult population in Pakistan does not trust financial institutions. Mistrust can arise from a wide range of factors and it may vary from person to person. Poor customer experience, exposure to corruption, and misconception regarding the benefits of accessing financial services are the key factors for the lack of confidence in financial institutions. Moreover, religious beliefs and cultural values also play an important role in shaping

the attitude of the local population toward financial institutions. Therefore, for an effective financial inclusion strategy, it is important for the regulators to gain the trust of the local population.

Lower financial inclusion of women is also an important determinant of lower financial inclusion in Pakistan. Of 21% adult male population, only 7% of females are financially included in Pakistan. The NFIS has set a target of 25% for women's financial inclusion, which is quite low as the overall financial inclusion target was set at 50%.

Another reason that can be attributed to the slow pace of financial inclusion is the poor infrastructure in the rural areas of Pakistan. Placing strong infrastructure in the form of reliable communication systems, transportation, and electricity can also improve the effectiveness of financial services. Insufficient infrastructure will tarnish the efficiency of the financial sector reforms in rural areas. Thus, financial sector reforms in rural areas should be accompanied by the government’s infrastructure development, especially in those areas which have the potential to spur economic growth.

On the credit side, Pakistan's position as far as credit to the private sector is concerned is very low. Over the last 50 years, Pakistan’s position with respect to other developing economies in providing credit to the private sector has declined (**see Appendix I**). Further bifurcation of private sector credit indicates that most of the credit is being parked at large corporate, whereas, SMEs and the agriculture sector only receive a meager share of the credit (**see Appendix J**). A mixture of supply-side and demand-side issues are largely responsible for this dismal performance which

even the current policies fail to overcome. Lack of credit history information, lengthy judicial proceedings against non-performing loans, lack of collateral, bank's risk-averse approach, and stringent capital requirements are the main supply-side issues that the current policies are unable to tackle. On the other hand, lack of information about financial products and services, interest rate volatility, and lack of awareness regarding client protection mechanisms are the key demand side obstacles. Tackling most of these issues requires long-term policy reforms which should be devised carefully and assessed periodically to ensure their effectiveness.

On a positive note, government policies have been successful in maintaining financial sector stability. Despite the exit of several commercial banks, domestic and foreign, financial policies have successfully avoided the system-wide systemic risk. Even though, macrofinancial linkages are relatively weak in Pakistan, the importance of financial sector stability cannot be undermined. Because financial instability is not only a long-run phenomenon but also can happen overnight, therefore, monitoring risk and implementing a risk-mitigating strategy has to be in place. In addition, from a stability perspective keeping the regulatory capital adequacy ratio high is encouraging. But on the flip side, it will restrict the financial institutions to venture towards risky investment which usually includes lending to SMEs, households, and the agriculture sector, and have a relatively higher probability of default as compared to the corporate sector.

CHAPTER 5

DATA AND METHODOLOGY

This chapter has two parts, data description and methodology used. The first section provides the definition of the data and the source used to extract each variable. This is followed by descriptive statistics and correlation analysis of the variables involved in the study. The second section describes the methodology used to construct the composite variable of financial development (FD) and the size of the informal economy. In the last part of this chapter, the methodology used for carrying out unit root tests for stationarity is also been included.

5.1 Data

The study utilizes annual time-series data to analyze the relationship between FD and the informal economy of Pakistan for the period 1990 to 2020. The input variables selected for developing an index of FD (core explanatory variable) are extracted from the WorldBanks GFDD and the State Bank of Pakistan's (SBP) website. The data on the informal economy of Pakistan, measured as a percentage of GDP, is taken from the World Bank's Informal Economy Database. The study includes three control variables, including, Tax Burden, Trade Openness, and Unemployment Rate.

5.2 Variables Description

5.2.1 Informal Economy (INF)

The informal economy is an unobserved variable which makes it challenging to estimate the extent of its existence. The World Bank's Informal Economy Database is relatively the most comprehensive source for acquiring the concerned data. The database provides country-wise estimates through various techniques, however, the estimates from the MIMIC model are of interest for the current study and the units of measurement are as a percentage of GDP.

5.2.2 Financial Development (FD)

The indicator of FD primarily captures the development of the banking sector. The indicator is in an index form based on several underlying variables encompassing four dimensions including, access, depth, efficiency, and stability. The table below provides the list of indicators against each dimension of FD. The data and the placement of the variables against each category are based on the classification made by GFDD.

Table 5.1: Dimensions of Financial Development

Models	Indicator(s)
ACCESS	Bank Account per 1,000 adults
DEPTH	Private Sector Credit to GDP (PSC)
	Deposit Money Bank Assets to GDP (DG)
	Liquid Liabilities to GDP (LLG)
EFFICIENCY	Government Credit to GDP
STABILITY	Bank Credit to Deposits

5.2.2.1 Bank Account per 1,000 Adults (ACCESS)

This variable measures the degree of access to financial services offered by commercial banks. A higher value indicates greater access to financial services for the adult population. The indicator is calculated as follows:

$$\textit{Bank Account per 1,000 adults} = \frac{\textit{No. of Depositors}}{\textit{Adult Population}} \textit{ x 1,000}$$

5.2.2.2 Private Sector Credit (PSC) to GDP

The indicator measures the financial resources provided by domestic money banks in terms of GDP to the private sector. In addition to commercial banks, domestic money banks also include other financial institutions that take transferable deposits, for example, demand deposits. A higher value reflects greater access to credit facilities in the private sector by deposit money banks and other deposit-taking financial institutions. Mathematically, the indicator is calculated as follows:

$$\textit{Private Sector Credit to GDP} = \frac{\textit{Private Credit by deposits from money banks and other financial institutions}}{\textit{Nominal GDP}}$$

5.2.2.3 Deposits Money Bank Assets to GDP (DG)

The assets of the deposit money banks include claims on the government (central, state, and local), real non-financial sector, non-financial public enterprises, and the private sector. The indicator is measured as follows:

$$\textit{Deposit Money Bank's Assets to GDP} = \frac{\textit{Deposit Money Bank Assets}}{\textit{Nominal GDP}}$$

5.2.2.4 Liquid Liabilities to GDP (LLG)

Liquid liabilities are also referred to as broad money, also known as M3. M3 is the sum of currency and deposits in the central bank (M0), transferable deposits and electronic currency (M1), foreign currency transferrable deposits, time and saving deposits, security repurchase agreements, certificates of deposits (M2), and others. A mathematical representation for measuring the indicator is given below:

Liquid Liabilities to GDP (%) = (Liquid Liabilities)/(Nominal GDP) x 100

5.2.2.5 Credit to Government and State-owned Enterprises to GDP (EFFICIENCY)

The indicator is the ratio between financial resources provided by deposit money banks to the government including state-owned enterprises and GDP. Higher provision of credit to this sector entails lower efficiency as it increases the crowding out of the private sector which offers a higher rate of return as compared to the government. The indicator is measured as follows:

$$\textit{Credit to Gov. and State Owned Ent. to GDP} = \frac{\textit{Credit to Gov. and State-owned Ent.}}{\textit{Nominal GDP}}$$

5.2.2.6 Bank Credit to Deposits (STABILITY)

This indicator measures the stability level of the financial sector. Bank credit includes financial resources provided by the deposit money banks to the private sector. On the other hand, deposits cover demand, savings, and time deposits in deposit money banks. The ratio represents the ability of the deposit money banks to cover customer withdrawals and loan losses. A higher ratio depicts lower stability as deposit money

banks would have insufficient reserves to deal with unexpected and expected contingencies. The indicator is measured as given below:

$$\textit{Bank Credit to Deposits (\%)} = \frac{\textit{Private Credit by Deposit Money Banks}}{\textit{Total Bank Deposits}} \textit{ x 100}$$

5.2.3 Mobile Financial Services (MFS)

The variable of MFS is a dummy variable that takes the value of '0' for the periods before the launching of the services in Pakistan and the value of '1' otherwise. Easypaisa was the first MFS to launch in Pakistan in 2009, thus, the variable MFS takes the value of '0' from 1990 to 2008 and '1' from 2009 to 2020.

5.2.4 Control Variable

5.2.4.1 Trade Openness (TRADE)

Trade Openness is an important factor in uplifting economic growth as it allows efficient allocation of resources, improves total factor productivity via knowledge dissemination and technology diffusion, and raises access to goods and services (Barro and Sala-i-Martin, 1997; Rivera-Baitz and Romer,1991). As a result, booming economic activity in the formal financial sector incentivizes economic agents of the informal economy to shift towards formality (La Porta and Schleifer, 2014). The variable is calculated as shown below:

$$\textit{Trade Openness (\%)} = \frac{\textit{Total Exports+Total Imports}}{\textit{Nominal GDP}} \textit{ x 100}$$

5.2.4.2 Tax Burden (TAX)

Tax burden measures the burden of taxes imposed by the government on households and firms. It includes all types of indirect and direct taxes measured as a percentage of GDP as given below:

$$\textit{Tax Burden (\%)} = \frac{\textit{Total Tax Revenue}}{\textit{Nominal GDP}} \textit{ x 100}$$

5.2.4.3 Unemployment Rate (UNEMP)

The unemployment rate is a portion of the labor force that is unemployed. The data on the unemployment rate is collected from the Federal Reserve Bank of St. Louis.

$$\textit{Unemployment Ratio (\%)} = \frac{\textit{Unemployed Labor}}{\textit{Total Labor Force}} \textit{ x 100}$$

5.3 Descriptive Statistics

Descriptive statistics represent the basic characteristics of the data in a summarized form. The elements used for this purpose include the mean, median, maximum value, minimum value, and standard deviation. First of all, the mean value provides an average value of a data series of a particular variable. Secondly, the median value is the middle value of a data series. Thirdly, the minimum and maximum values represent the range of a data set, and last, the standard deviation provides represents the dispersion of the data with respect to its mean. The table below shows the descriptive statistics of the variables used in the present study:

Table 5.2: Descriptive Statistics

Variable Name	Mean	Median	Maximum	Minimum	Stand. Deviation
INF	36.14947	35.67776	38.23329	34.19639	1.310710
FD	0.560194	0.561900	0.681787	0.355726	0.071229
TAX	11.67419	11.40000	14.40000	9.10000	1.563962
TRADE	27.25071	27.87189	35.14351	19.59272	4.099678
UNEMP	2.831194	1.370000	9.214000	0.835000	2.717378

Notes: (i) INF denotes the size of the informal economy as a percentage of GDP; (ii) FD represents the financial development index; (iii) TAX measures tax burden; (iv) TRADE measures trade openness; and (v) UNEMP measures unemployment level.

5.4 Correlation Analysis

The degree and direction of a relationship between two variables are determined via correlation analysis. A positive association is shown by a coefficient of correlation larger than zero; a negative association is indicated by a correlation coefficient less than zero. Finally, a zero correlation coefficient reflects no relationship between the two variables. The table below reflects the degree of correlation along with their p-value for significance:

Table 5.3: Correlation Matrix

Variable Name	INF	FD	TAX	TRADE	UNEMP
INF	1.0000 ------				
FD	-0.633355 (*0.0001*)	1.0000 -----			
TAX	0.613635 (*0.0002*)	-0.401797 (*0.0251*)	1.0000 -----		
TRADE	0.541201 (*0.0017*)	-0.453030 (*0.0105*)	0.226781 (*0.2199*)	1.0000 -----	
UNEMP	-0.659260 (*0.0001*)	0.281811 (*0.1246*)	-0.010059 (*0.9572*)	-0.623695 (*0.0002*)	1.000 -----

Notes: Values in parenthesis below each of the correlation coefficient values is the associated level of probability value.

INF (the dependent variable) shows a moderate correlation with all other variables included in the study, hence, justifying the selection of the variables for empirical analysis. Moreover, the correlation coefficient of INF with other variables, either negative or positive, is all significant at the 5% level. Apart from the dependent variable, amongst other variables, a relatively stronger correlation exists between UNEMP and TRADE with a coefficient of negative 0.623 significant at a 1% level. As a result, the correlation matrix does not indicate the presence of strong multicollinearity among the variables.

5.5 Methodology

The study aims at answering the research questions by using the following generalized equations:

$$INF = f(FD, TAX, TRADE, UNEMP, MFS) \quad (5.1)$$

$$INF = f(ACCESS, TAX, TRADE, UNEMP) \quad (5.2)$$

$$INF = f(DEPTH, TAX, TRADE, UNEMP) \quad (5.3)$$

$$INF = f(EFFICIENCY, TAX, TRADE, UNEMP) \quad (5.4)$$

$$INF = f(STABILITY, TAX, TRADE, UNEMP) \quad (5.5)$$

Where,

INF = Size of the Informal Economy as a percentage of GDP

FD = Financial Development

MFS = Dummy variable of Mobile Financial Services

TAX = Tax Burden

TRADE = Trade Openness

UNEMP = Unemployment Rate

ACCESS = Access dimension

DEPTH = Depth dimension

EFFICIENCY = Efficiency dimension

STABILITY = Stability dimension

To approach a specific form of the equation, the methodological approach adopted is discussed in the subsequent parts of this chapter.

5.5.1 Financial Development (FD)

The indicator of FD is in an index form, ranging between '0' and '1', derived from the variables as shown in table 5.1. To develop an index, the study follows the strategy given by Svirydzenka (2016). At first, each indicator is normalized between '0' and '1' using the min-max procedures by using the following equations:

$$I_x = X - X_{min}/X_{max} - X_{min} \quad (5.6)$$

$$I_x = 1 - (X - X_{min})/(X_{max} - X_{min}) \quad (5.7)$$

All variables are normalized by using equation 5.6, whereas, the variable of efficiency and stability are normalized using equation 5.7. The reason is that higher values of these variables depict lower efficiency and stability, thus, rescaling them with equation 5.7 will bring them parallel to other variables in a way that higher scaled values would reflect higher FD.

As opposed to other dimensions, the depth dimension involves three variables. To generate a single series, the three variables of depth after normalization are aggregated through a weighted linear average where weights are the squared factor loadings obtained through the Principal Component Analysis (PCA) of the variables. The loading reflects the portion of the overall unit variance of the indicator which is explained by the factor. The variable which contributes more in the direction of common variation gets the higher weight.

$$Depth = \sum_{i=1}^{n} wiDi \quad (5.8)$$

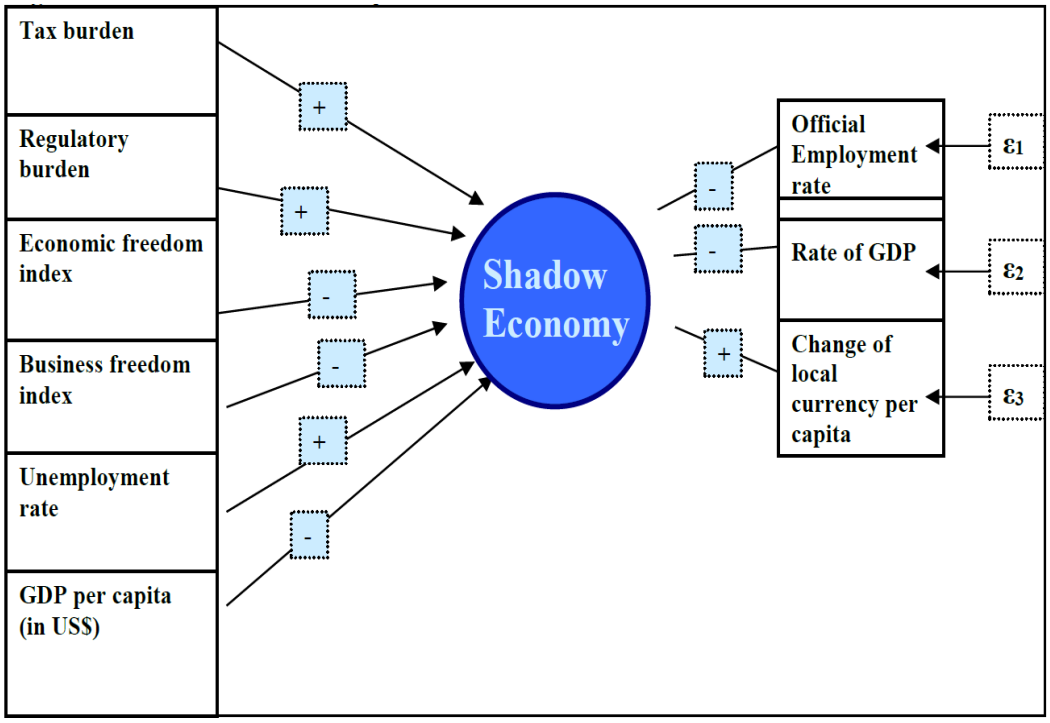
After having four scaled sub-indices of FD, the next step is to develop an aggregate index of FD. For this step, once again PCA is applied across the sub-indices, and with the help of squared factor loadings as weights, the overall index of FD is derived through the weighted average of sub-indices as shown in the following equation. Estimates of FD are placed in Appendix C.

$$FD = w_{Dep} \,.\, Depth + w_{eff} \,.\, Efficiency + w_{stb} \,.\, Stability + w_{acc} \,.\, Access \qquad (5.9)$$

5.5.2 Multiple Indicators and Multiple Causes (MIMIC) Approach

The MIMIC approach is a type of structural equation modeling (SEM) that is extensively used in social sciences. It is a theory-based approach that is used to confirm the effect of exogenous causal variables on the unobserved variable (latent variable). Thus, the MIMIC model is a confirmatory strategy since it establishes a link between exogenous and latent variables. The MIMIC model includes two parts (Medina and Schneider, 2018). The first part is the structural model that establishes the relationship between the unobserved variable and its causes, and the measurement model provides the link between the latent variable and its indicators.

As mentioned earlier, the current study will use the readily available estimates of the informal economy's size from the World Bank's Informal Economy Database. However, it is important to mention that the database follows the strategy proposed by Schneider et al., 2009 which uses six causes of the informal economy and three indicators to capture the estimates of the informal economy. Estimates of Pakistan's informal economy through the MIMIC model are placed in Appendix D. A graphical representation of the MIMIC model based on Schneider et al., 2009 is given below:



Source: Schneider, Buehn and Montenegro (2010).

***Figure 5.1**:* Illustration of the MIMIC Model

5.5.3 Stationarity Test

Before applying any modeling technique to time-series data it is important to determine whether it is stationary or not. A data set is said to be stationary if the values converge to its long-run average value, in addition, the characteristics of the data are also not time-dependent. On the other hand, if a time series data does not converge to its long-term mean value it is said to be non-stationary, and its characteristics (mean, variance, and covariance) change over time.

To confirm whether the variables are stationary, a statistical method called the 'unit root test' is performed. Amongst the various methods for testing unit roots, the study performs the Augmented Dickey-Fuller (ADF) test for this purpose. The ADF tests for unit root as follows:

$$\Delta y_t = \mu + \theta y_{t-1} + \sum_{i=1}^{k} \beta i \Delta y_{t-1} + e_t \qquad (5.10)$$

Where,

$\theta = \alpha - 1$

α = coefficient of y_{t-1}

Δy_t = first difference of y_t, i.e., $y_t - y_{t-1}$

The null hypothesis of ADF suggests that $\theta = 0$, on the other hand, at alternative hypothesis $\theta < 0$. If the null hypothesis is not rejected, then the series is said to be non-stationary, while rejection of the null indicates that the series is stationary. The results are disclosed in table 5.1, and based on those results the study adopts the ARDL approach for carrying out empirical analysis.

When selecting the number of lags to be included in the model, the study first conducts a vector auto-regressive model with the variables in the following order; INF, FD, TAX, TRADE, and UNEMP. Based on the results of the lag length criteria, the study uses a maximum number of four lags across all the models with estimation criteria set at Akaike Information Criteria (AIC).

5.5.4 Autoregressive Distributed Lag (ARDL) Model

The ARDL model is an ordinary least square (OLS) that is applied to non-stationary time series data and mixed-ordered co-integration time series data. Another benefit of using an ARDL model is that it allows analyzing the short-term and long-term relationship between the variables by adding lags of the independent and dependent variables, irrespective of whether the regressors involved are exogenous or endogenous (Pesaran and Shin, 1995; Pesaran and Smith, 1995).

The ARDL form of each equation, from 5.1 to 5.5, respectively, are given below:

$$Log(INF) = \sum_{j=1}^{p} \alpha_i \, logINF_{t-j} + \sum_{j=0}^{p} \beta_i \, logFD_{t-j} + \sum_{j=0}^{p} \theta_i \, logTAX_{t-j} + \sum_{j=0}^{p} \sigma_i \, logTRADE_{t-j} + \sum_{j=0}^{p} \varphi_i \, logUNEMP_{t-j} + \text{MFS} + \varepsilon_t \quad (5.11)$$

$$Log(INF) = \alpha_0 + \sum_{j=1}^{p} \alpha_i \, logINF_{t-j} + \sum_{j=0}^{p} \beta_i \, logACCESS_{t-j} + \sum_{j=0}^{p} \theta_i \, logTAX_{t-j} + \sum_{j=0}^{p} \sigma_i \, logTRADE_{t-j} + \sum_{j=0}^{p} \varphi_i \, logUNEMP_{t-j} + \varepsilon_t \quad (5.12)$$

$$Log(INF) = \sum_{j=1}^{p} \alpha_i \, logINF_{t-j} + \sum_{j=0}^{p} \beta_i \, logDEPTH_{t-j} + \sum_{j=0}^{p} \theta_i \, logTAX_{t-j} + \sum_{j=0}^{p} \sigma_i \, logTRADE_{t-j} + \sum_{j=0}^{p} \varphi_i \, logUNEMP_{t-j} + \varepsilon_t \quad (5.13)$$

$$Log(INF) = \alpha_0 + \sum_{j=1}^{p} \alpha_i \, logINF_{t-j} + \sum_{j=0}^{p} \beta_i \, logEFFICIENCY_{t-j} + \sum_{j=0}^{p} \theta_i \, logTAX_{t-j} + \sum_{j=0}^{p} \sigma_i \, logTRADE_{t-j} + \sum_{j=0}^{p} \varphi_i \, logUNEMP_{t-j} + \varepsilon_t \quad (5.14)$$

$$Log(INF) = \sum_{j=1}^{p} \alpha_i \, logINF_{t-j} + \sum_{j=0}^{p} \beta_i \, logSTABILITY_{t-j} + \sum_{j=0}^{p} \theta_i \, logTAX_{t-j} + \sum_{j=0}^{p} \sigma_i \, logTRADE_{t-j} + \sum_{j=0}^{p} \varphi_i \, logUNEMP_{t-j} + \varepsilon_t \quad (5.15)$$

CHAPTER 6

EMPIRICAL ESTIMATION AND RESULTS

This section provides the empirical results of all the models along with their respective residual and diagnostic test results. The chapter begins by providing the results of the unit root test for stationarity conducted through the Augmented Dickey-Fuller Test, the results are available in table 5.1. Following the unit root test results, table 5.2 comprehensively provides the results of all the models under study. This includes the short-run results, long-run results, residual diagnostic test results, and Bound Test results. The results of each model are discussed separately in this chapter.

6.1 Unit Root Test – Results

The results of the unit root test are placed in the table below. Using the ADF test, all the variables were first tested at levels for confirming stationarity. Based on their t-statistic and p-value no variable was found stationary at the level. However, after taking the first difference all the variables were found stationary at a 5% significance level. The choice of adding intercept and trend during the ADF test was based on the significance level for each variable after regressing each variable on its trend and intercept. As mentioned earlier, following Shrestha and Bhatta (2018), based on the stationarity results the study uses the ARDL approach for the empirical analysis.

Table 6.1: Augmented-Dickey Fuller (Unit Root) Test Results

Variables	**p-value**	**t-stat**
Log(INF)	0.4210	-2.300359
ΔLog(INF)	0.0007	-5.413735
Log(FD)	0.0724	-3.385284
ΔLog(FD)	0.0088	-4.363116
Log(TAX)	0.6316	-1.896023
ΔLog(TAX)	0.0000	-7.076332
Log(TRADE)	0.5335	-2.080054
ΔLog(TRADE)	0.0023	-4.935116
Log(UNEMP)	0.9136	-1.092871
ΔLog(UNEMP)	0.0031	4.812058

Table 6.2: Empirical Results and Diagnostic Tests

Dependent Variable (INF)	Model 1	Model 2	Model 3	Model 4	Model 5
Panel A: Short-run Effect					
EC Term	-1.871287***	-4.961132***	-0.075886***	-0.692439***	-0.320846**
MFS	-0.057163**				
Log(INF(-1))	-0.690698	-4.147473**	0.924114***	1.059224**	-1.072496
Log(INF(-2))	2.344263***	1.832921**		0.783423***	1.939480
Log(INF(-3))	-0.443532*	-2.470074**		0.226832	0.204388
Log(INF(-4))		0.823494*		-1.761918***	-0.392219
Log(FD)	-0.150869***				
Log(FD(-1))	-0.434550***				
Log(FD(-2))	0.009385				
Log(FD(-3))	-0.054501				
Log(FD(-4))	0.144623***				
Log(ACCESS)		0.044384			
Log(ACCESS(-1))		0.185344			
Log(ACCESS(-2))		-0.164928			
Log(ACCESS(-3))		-0.420502**			
Log(ACCESS(-4))		-0.463730**			
Log(DEPTH)			0.009317		
Log(DEPTH(-1))					
Log(DEPTH(-2))					
Log(DEPTH(-3))					
Log(DEPTH(-4))					
Log(EFFICIENCY)				-0.040712**	
Log(EFFICIENCY (-1))				-0.019545	
Log(EFFICIENCY (-2))				-0.094304***	
Log(EFFICIENCY (-3))				-0.008862	
Log(EFFICIENCY (-4))				0.021148**	
Log(STABILITY)					-0.009974
Log(STABILITY(-1))					0.138300
Log(STABILITY(-2))					0.216394
Log(STABILITY(-3))					0.021027
Log(STABILITY(-4))					-0.080982
Log(TAX)	0.012272	0.041454	0.019939	0.011984	0.114897
Log(TAX(-1))	0.079529**	0.259001**	-0.028351	0.078680**	0.169219
Log(TAX(-2))	-0.112483***	0.299095**	-0.031466	-0.091602**	-0.037228
Log(TAX(-3))	-0.127151**	0.108668**	0.071483**		-0.130573
Log(TAX(-4))	-0.044063*	0.248059**			
Log(TRADE)	-0.089779**	-0.414904**	0.013167	0.030957*	-0.135629*
Log(TRADE(-1))	0.159174***	0.056127*	0.029869	0.035234*	0.073216
Log(TRADE(-2))	0.035915	-0.039048	0.000503	0.067181**	0.044410
Log(TRADE(-3))	-0.102482***	-0.001214	-0.023423	-0.100153**	-0.046719
Log(TRADE(-4))	-0.166733***	-0.169876*	0.039609*	0.077897**	-0.038324
Log(UNEMP)	-0.014927*	0.029698*	0.002251	0.0000982	0.009659
Log(UNEMP(-1))	0.027110**	0.032797*		0.032960***	0.036442
Log(UNEMP(-2))	0.002986	0.016495		0.014993**	0.018896
Log(UNEMP(-3))	-0.017840**	-0.023294		-0.007292*	-0.018602
Log(UNEMP(-4))	0.027577**			0.028255**	-0.025804
CONSTANT		22.73008**		2.474759***	
TREND		-0.037374**			
Panel B: Long-run Effect					
Log(FD)	-0.138835*				
Log(ACCESS)		-0.165171**			
Log(DEPTH)			0.122780**		
Log(EFFICIENCY)				-0.205471***	
Log(STABILITY)					0.887545***
Log(TAX)	-0.020196	0.192754**	0.416482**	-0.001354	0.362526*
Log(TRADE)	-0.114297***	0.011226	0.787037***	0.160471**	-0.321172
Log(UNEMP)	0.011220*	-0.114675**	0.029664	0.099668**	0.064180*
Panel C: Residual Diagnostic					
Normality Test	0.023159	4.029352	2.326137	0.077125	0.111878
Serial Correlation LM Test (F-statistic)	12.61221	18.22832	1.150755	144.6922	1.949276
Heteroscedasticity Test (F-statistic)	2.687114	1.184277	2.264650	9.904189*	2.199161
Panel D: Bound Test					
F-statistic	24.21742***	12.77859***	2.513793	19.35933***	1.945444
t-statistic	6.696818***	-6.001843***	-2.256132	-5.5868333***	-2.87243

Notes: (i) INF denotes the size of the informal economy as a percentage of GDP, FD denotes financial development, TAX represents tax burden, TRADE measures trade openness, UNEMP reflects the unemployment rate; (ii) Normality test is conducted through the Jarque-Bera test for goodness of fit; (iii) Breusch-Godfrey test is used for testing the presence of serial correlation; (iv) Breusch-Pagan-Godfrey Test is used for testing heteroscedasticity; (v) * and ** and *** represents significance level at 10%, 5%, and 1% level, respectively.

6.2 Model 1

This model refers to equation 5.1 given in chapter 5.

6.2.1 Model 1 – Short-run Results

First of all, the INF is found to have a significant relationship at a 5% level with its second lag period with a coefficient of 2.344. Going forward, FD and FD_{t-1} are found to have a significant relationship with INF. In both cases, the coefficients are negative indicating that overall FD does shrink the informal economy, but comparatively the relationship holds more significance during the first lag period. This finding is consistent with the view that FD reduces the cost of credit and incentivizes informal economy participants to reveal their income and shift towards the formal sector to avail the benefits of formal financial services (Capasso and Jappelli, 2013). The dummy variable of MFS is also found to have a significant effect on INF with a negative coefficient of 0.057163. This result supports the findings of the panel data study conducted by Jacolin et al. (2019).

Moving towards the control variables, the indicator of the tax burden (TAX) is found to have a positive relationship with the informal economy at the level and first lag period. At level, the coefficient of TAX is insignificant indicating that an increase in tax burden does not effectively change the dependent variable. However, during the first lag period, TAX has a significant impact at a 5% level on INF such that an increase in tax burden by 1% increases the size of the informal economy by 0.07%. This relationship is due to the fact that a higher tax burden incentivizes individuals/firms to conceal their financial information to avoid taxes, thereby, raising the level of informal

activity. The result is consistent with Canh and Thanh (2020) who also found a positive lag impact of taxation on the size of the informal economy.

Trade Openness (Trade) at the level has negative and a significant impact on the size of the informal economy such that an increase in trade openness by 1% reduces the size of the informal economy by 0.089%. Trade openness as a result of government policies may allow trade-oriented industries and more productive firms within that industry to scale up their operations and raise their market shares. Since formal firms are relatively more productive than informal firms (La Porta and Shleifer, 2014), informal firms would exit the market in the wake of high competition from the formal sector (Salem and Zaki, 2017).

UNEMP has a significant impact at a 5% level on the informal economy during its first lag period. At this level, a 1% increase in the UNEMP is found to raise INF by around 0.03 percent. The relationship is plausible due to the fact that as the labor force is left out of the formal firms, they tend towards the informal economy for employment opportunities. This finding is consistent with Capasso and Jappelli (2013) who also found a positive relationship between informal activity and the unemployment rate.

6.2.2 Diagnostic Tests – Model 1

The study conducts three residual diagnostic tests and one coefficient diagnostic test across all the models used in the study. The residual diagnostic tests include normality, serial correlation, and heteroscedasticity test. For coefficient diagnostic, the study conducts the Bound test. The diagnostic test begins with the residual testing with Jarque-Bera normality test. Since the results are not significant at the 5% level,

indicating that the residuals are normally distributed. For serial correlation, the null hypothesis states that no serial correlation exists among the residuals. Since the F-statistics p-value is 0.1953, the study accepts the null hypothesis and concludes that the residuals are serially uncorrelated at a 5% significance level. Similarly, the null hypothesis for testing heteroscedasticity indicates that the residuals are homoscedastic. Given the F-statistic p-value of 0.3068, once again the study accepts the null hypothesis, justifying that the residuals are homoscedastic at a 5% level of significance.

To test the presence of a long-run co-integration relationship between the variables, the study proceeds toward the Bound test. For a long-run relationship to exist between the variables, it is necessary for the F-statistic and t-statistic values to be greater than the critical value of I (1) in absolute terms at a 5% significance level. The results suggest that the values of the F-statistic and t-statistic both are greater than the I (1) critical bound value in absolute terms and significant at the 1% level. Thus, the null hypothesis can be rejected which states that there is no equilibrium relationship and accept that there is a long-run relationship between the variables.

6.2.3 Long-run Results – Model 1

The long-run results reveal that informal economy has a significant relationship with FD, TRADE, and UNEMP. First of all, over the long-run a 1% raise in FD is found to reduce INF by 13.9% at a significance level of 10%. This finding is found to be consistent with other studies covered in the literature review section where financial development was also found to reduce the size of the informal economy (Bose et al., 2012; Capasso and Jappelli, 2013; Berdiev and Saunoris, 2016; Omri, 2020;

Katircioglu and Imamoglu, 2020; Canh and Thanh, 2020). Out of these studies, the most relevant study is of Canh and Thanh (2020) which examines the long-run relationship between financial development and informal economy. While the concerned study didn't measure this relationship specifically for Pakistan, however, it divided the sample of countries into lower income, middle-income, and upper-income countries. The results for lower-income countries, where Pakistan falls, is also consistent with the findings of this study. Thus, long-term policy measures by the financial regulators can be said to effective in reducing informal activity in Pakistan. But which dimension is largely contributing to the overall financial development is discussed in the subsequent models used in the study.

The coefficient of TRADE indicates that over the long a 1% growth in trade openness reduces the size of the informal economy (INF) by 11.4% at 5% significance level. This result is parallel with the findings of Imamoglu (2021) where trade openness is also found to have a negative and significant relationship with the informal economy. Government policies like free trade agreements with other countries (China, Sri Lanka, and other SAARC countries), reduction in trade taxes, and interest-based subsidy on exports are the key possible reasons for incentivizing the informal economy to transition towards the formal economy.[18][19]

The long-run relationship between UNEMP and INF is positive and statistically significant at 10% level, such that, 1% increase in UNEMP is accompanied with 1.1%

[18] https://www.commerce.gov.pk/about-us/trade-agreements/
[19] https://pide.org.pk/blog/the-challenges-to-pakistans-national-tariff-policy/#:~:text=Through%20first%20decade%20of%202000s,declining%20the%20exports%20to%209.1%25.

increase in the INF. This reveals that as unemployment in the formal sector increases, a fraction of unemployed working labor engage themselves in self-employment for generating their source of income. However, since the self-employed professionals working activity does not come into record, this gives rise to the informal activity (Capasso and Jappelli, 2013).

6.3 Model 2

This model refers to equation 5.2 given in chapter 5.

6.3.1 Short-run Results – Model 2

The model under consideration aims at capturing the impact of one of the dimensions of FD, i.e., "ACCESS" of the financial sector on the INF of Pakistan. The "ACCESS" dimension is measured by the number of bank accounts per 1000 adults. The short-run results reveal that the "ACCESS" dimension of the FD does not affect INF at level, first lag, and second lag period. However, the relationship gains significance in the third lag and fourth lag. At the third lag, a 1% increase in the number of bank accounts is found to diminish the size of the informal economy by 0.42%. At the fourth lag, the impact is relatively more significant as a 1% change in the number of accounts reduces the informal economy by 0.46%.

TAX has no significant influence on INF at the level at 5% significance level, but the lag impact of TAX is consistent and significant across all the lags included in the model. At first lag, a 1% increase in TAX raises INF by 0.26%. At the second lag, the coefficient of TAX increases to 0.299%. Although at the third lag the coefficient of

TAX declines to 0.108%, however, it rebounds at the fourth lag and increases to 0.248%.

In Model 2, the role of UNEMP is insignificant on INF at the level and across all the lags at the 5% level. However, TRADE is found to reduce only its level while the lag impact across all the lags is insignificant at a 5% level. At level, the size of INF decreases by 0.414% against a 1% increase in TRADE.

6.3.2 Diagnostic Tests – Model 2

The first test conducted was the Jarque-Bera normality test. With the p-value of 0.133264, we fail to reject the null hypothesis and confirm that the residuals are normally distributed. Next serial correlation LM test is performed and based on the p-value of the F-statistic, the null hypothesis is accepted, hence, concluding that no serial correlation exists between the residuals. Similarly, the null hypothesis of the heteroscedasticity test is also accepted as the F-statistic value is found to be insignificant at the 5% level.

Moving towards the coefficient diagnostic, the study conducts the bound test to check the presence of long-run co-integration between ACCESS and the size of the informal economy (INF). In absolute terms the F-statistic and t-statistic value is greater than the critical value at I (1) at a 1% significance level, thus, indicating that ACCESS does have a long-run relationship with INF.

6.3.3 Long-run results – Model 2

The long-run relationship indicates that "ACCESS" is one of the dimensions of FD that reduces INF. An increase in ACCOUNT by 1% reduces the INF by 0.16% over the long run. The result is parallel with Canh and Thanh (2020) where a long-run negative relationship was also established between financial institutions' access -dimension and the informal economy. One of the main functions of financial institutions is to provide access to finance to economic agents, but in Pakistan, only 21% of the adult population is covered by the financial sector.[20] The portion of the population not covered does include a fraction of adults who are unwillingly financially excluded. Therefore, since a large portion of the adult population is financially excluded, providing access to finance would reduce their incentive to operate in the informal economy. It is pertinent to mention that speed of adjustment as reflected in COINTEQ (-1), which is also the error correction (EC) term is very high. The coefficient of the EC term is -4.96 which indicates that about 496% of any movement into the disequilibrium is adjusted within one period. Apart from a very high value, the coefficient is also highly significant at the 1% level.

As in Model 1, the coefficient of TAX is again found to have a significant and positive impact on INF over the long run. The results indicate that a 1% increase in TAX is found to support INF by 0.19%. This tends to show that the adult population does weigh between opening a banking account and the impact of taxes as a result of income disclosure. TRADE, on the other hand, also holds significance at a 5% level and the

[20] Financial Inclusion Insight Survey, 2020

result indicates that a 1% improvement in trade openness helps in reducing the size of the informal economy by 0.11% over the long run. Lastly, the coefficient of UNEMP is found not to be significant at a 5% level to affect INF over the long run.

6.4 Model 3

This model refers to equation 5.3 given in chapter 5.

6.4.1 Short-Term Results – Model 3

The model under consideration envisages capturing the impact of the "DEPTH" dimension of FD on the INF of Pakistan. As mentioned earlier, "DEPTH" is a weighted average index derived from three indicators of FD (see table 5.1). In Model 3, DEPTH is found to have an insignificant impact on INF. This indicates that credit disbursement or financial sector asset penetration does not alter the economic agent's preference between informal or formal economy. One of the possible reasons for the nature of the relationship exists is that the asset mix of the banking sector is more inclined towards investment in government securities as compared to providing credit to the private sector. As far as the credit penetration as a percentage of the GDP of Pakistan is concerned, it is not only declining but also very low with respect to other comparable economies (**see Appendix H**). Moreover, the credit which is being provided is mostly absorbed by the corporate sector (71.1% of total loans) as compared to the SME sector (5.1%) and consumer sector (7.0%).[21] Keeping in view the asset composition of the

[21] State Bank of Pakistan - Financial Soundness Indicators and Quarterly Compendium of the Banking Sector, Dec - 2020

banking sector and the strong preference towards the corporate sector for supplying credit, the insignificant role of DEPTH on INF is logical.

6.4.2 Diagnostic Tests – Model 3

As done in the earlier models, the residuals are first tested for normality and the results suggested that the residuals are normally distributed as the p-value of Jarque-Bera was insignificant at 5% with a value of 0.312526. Afterward, the residuals were tested for serial correlation and heteroscedasticity, and the results indicate none of the two issues as reflected by the F-statistic p-value was found to be greater than 5%.

Despite the absence of a short-run relationship, the study proceeds to check the possibility of a long-run relationship between the two variables by computing the Bound Test. The results of the test suggest that there is no long-run relationship between the two variables. The reason is that the value of the F-statistic and t-statistic is lower than the critical value of I (1) at a 5% as well as a 10% level of significance. Therefore, the results fail to reject the null hypothesis and confirm no level of relationship. As a result, it is meaningless to proceed with analyzing the long-run relationship.

6.5 Model 4

This model refers to equation 5.4 given in chapter 5.

6.5.1 Short-run Results – Model 4

The current model focuses on the financial efficiency dimension. EFFICIENCY is measured by the ratio between government credit to GDP. In this model specification, INF is found to be positively influenced by its lag terms in the first and second periods at a 5% significance level. EFFICIENCY, on the other hand, at lag, and at second difference exhibits an inverse relationship with INF at a 5% significance level. Since EFFICIENCY is measured by the ratio between government credit to GDP, this shows that government operations financed by the banking sector have been effectively used to curb informal activities. more credit supply to the government helps them to curb informal activities.

The role of TAX remains significant across the two lag periods. At the first lag period, a 1% increase in TAX is found to expand INF by 0.07%, but at the second lag, the relationship is negative as a 1% increase in TAX reduces INF by 0.09%. UNEMP is also found to have a significant lagged impact on INF. The relation is relatively more significant and impactful in the first lag period concerning the other lag intervals. Finally, the impact of TRADE remains insignificant at a level and at first lag. Across the subsequent lag period, the relationship, although significant at a 5% level, depicts a mixed nature of the relationship between TRADE and INF.

6.5.2 Diagnostic Tests – Model 4

In residual testing, the normality test was first conducted which affirmed that the residuals are normally distributed as the p-value of Jarque-Bera exceeded 0.05. The second test performed was to check the presence of serial correlation. Based on the

results obtained the null hypothesis is not rejected implying that the residuals are serially not correlated with one another. However, the results of the heteroscedasticity test allow the null hypothesis to be rejected confirming the presence of heteroscedasticity as the p-value is less than 0.05. To address this problem, model 4 was performed again while addressing the problem of heteroscedasticity.[22] The results of the model indicated no change in the relationship as well as in terms of significance across all the variables included in the model.

After establishing the short-run relationship, the study proceeds towards exploring the long-run relationship between EFFICIENCY and INF. To confirm the long-run relationship the study once again relies on the Bound Test. The results reveal that the value of the F-statistic and t-statistic both in absolute terms are greater than the critical values of I (1) at the 5% level. This allows us to reject the null indicating no level of relationship, and agree that EFFICIENCY and INF do have a long-run relationship.

6.5.3 Long-run results – Model 4

As validated by the Bound test results, EFFICIENCY does have a long-run equilibrium relationship with INF. The nature of the relationship is that a 1% increase in EFFICIENCY allows INF to decline by 0.205% which is significant at a 5% level. The results remain robust with Canh and Thanh (2020), who also established a long-run inverse relationship between the two concerned variables. In this case, the results mean that the provision of credit to the government supports them to finance their measures

[22] To address the problem of heteroscedasticity, model 4 has been re-estimated through ARDL approach by keeping the coefficient covariance matrix specification at "White".

in curbing informal activity in Pakistan. The EC term or COINTEQ has a coefficient estimate of negative 0.692. This shows that any movement in disequilibrium of about 69.2% is adjusted within one period. In addition, given the very large t-statistic value of negative 13.913, it can also be concluded that the coefficient is highly significant at the 1% level.

6.6 Model 5

This model refers to equation 5.5 given in chapter 5.

6.6.1 Short-run Results – Model 5

Model 5 focuses on determining the role of the STABILITY dimension in the informal economy of Pakistan. The "stability" dimension as measured Bank Credit to Deposits ratio is shown in table 5.1. The short-run results of the model disclose that none of the variables are found to significantly influence the size of the informal economy of Pakistan. STABILITY, which is the core explanatory variable of the model is also found to have an insignificant impact on INF at the level and across all the lag periods at 5% as well as at a 10% significance level. This tends to show that economic agents do not consider the stability of the financial sector as a telling factor when deciding between formal and informal economies. The results are consistent with Liu-Evans and Mitra (2019) who also found that banking stability has no significant impact on the size of the informal economy, especially, in those countries where the level of FD is relatively lower.

6.6.2 Diagnostic Tests – Model 5

First of all, the normality test suggests that residuals are normally distributed as the Jarque-Berra p-value equals 0.945597 which exceeds the 5% significance level. Moving forward, the test for serial correlation and heteroscedasticity is also performed, and once again in both residual tests, we fail to reject the null indicating no serial correlation and no issue of heteroscedasticity among the residuals.

Even though the short-run results suggest no significant relationship between STABILITY and INF. The study still proceeds for investigating any long-run relationship between the two variables. For this purpose, the study once again performs the Bound Test to verify whether the long-run coefficients need to be interpreted or not. The results confirm that there is no long-run relationship between STABILITY and INF. The reason is that the F-statistic and t-statistic value is lower than the critical value at I (1) at a 5% as well as 10% significance level. Therefore, the study does not proceed toward interpreting the model's long-run dynamics.

CHAPTER 7

CONCLUSION

The aim of the study was to analyze the relationship between FD and the INF of Pakistan. The study takes a broader approach to capture financial development (FD) by including several banking sector indicators encompassing four dimensions (access, depth, efficiency, and stability). The study also includes a dummy variable of MFS to compare its significance on the informal economy relative to FD. Using annual time-series data over the period of 1990-2020, the study employed the ARDL approach to analyze the role of FD, its dimensions, and MFS in shaping the magnitude of informal activity of Pakistan.

The results drawn from the five models provide some interesting insights regarding the nature of the relationship between FD and the informal economy. First of all, short-run analysis reveals that overall FD does reduce the informal economy. Across the four dimensions, only financial access and financial efficiency were found to negatively and positively influence the informal economy, respectively. On the other hand, financial depth and financial stability were found to have no significant impact on the informal economy. MFS also had a negative impact on the informal economy, however, the relationship was marginally not as much significant and impactful as FD. Secondly, over the long-run FD was negatively linked with the size of the informal economy of Pakistan, on the other hand, dimension-wise the relationship was the same as in the short run.

Considering the access dimension first, the result suggests that the impact of opening a bank account is very significant on the size of the informal economy. This tends to show that most of the adult population is being deprived of basic banking services. The same is also reflected by the Financial Inclusion Insight Survey which estimated that only 21% of the adult population of Pakistan is covered by the formal financial sector. Therefore, incorporating additional customers in the financial sector through bank expansion could further significantly bring the adult population to the formal sector and reduce informal activity.

Secondly, the decline in financial efficiency is also found to reduce informal activity which is in sharp contrast with other studies (Bose et al., 2012; Canh and Thanh, 2020). While the choice of indicator that has been used to capture this dimension could be a key reason for this contradiction, nonetheless, it suggests that the banking sector credit supply to the government does assist the government in reducing informal activity. For instance, borrowing from the banks might allow the government to finance its fiscal operations without needing to increase taxes. Moreover, through borrowing from the banks, the government may also finance its development expenditure which can be a major source of employment generation in the formal sector.

The use of MFS has been also found to bring the adult population towards the formal sector. The role of MFS has been significant as it is a cost-effective way of providing financial services, especially, in rural areas where establishing a formal banking infrastructure would be costly. Since MFS is the most basic form of fintech, other applications pertaining to this sector can also affect the size of the informal economy.

In line with the short-term results, long-term government policies aimed at promoting financial development has been successful in reducing the extent of informal economy in Pakistan. In this regard, providing more access to financial services has been the key driver of overall financial development in the short-run as well as the long-run. Based on these results, providing more access to financial services is and should be the main priority, however, other dimensions cannot be ruled. For instance, from credit point of view the financial authorities have primarily focused on policies to raise the supply of credit. However, policies are required that would increase the demand for credit. The reason is that as the number of individuals/entrepreneurs will open bank accounts, the next thing they would require is bank credit. If government policies that directly and indirectly makes bank credit costly, reducing informal economy through financial development will reach to a stalemate. Therefore, increased efforts for raising financial access and a new policy approach for increasing the demand and to some extent supply for private sector credit is required to lift overall financial development and make formal economy more favorable for households and business as compared to the informal economy.

There are some limitations of the study that, if addressed, might provide more reliable results. First of all, the non-availability of the data confined the sample period to only 1990 to 2020. If the study stretches back to the 1970s then it could more adequately capture financial development as it would take into account the impact of the Nationalization Act of the 1970s, which caused a severe disruption of financial services to the financial sector. Moreover, data limitations also affected the choice of indicators used to capture several dimensions of financial development. Incorporating multiple

indicators for each dimension would have allowed a better coverage of each dimension of financial development.

CHAPTER 8

POLICY REFERENCE

Despite some of the limitations of the study some valuable findings can be drawn for policy recommendation. The recommendations are drawn on the basis of the regression results and critical analysis of the existing policy measures. With reference to financial access, the following policy recommendations should be considered to accelerate the pace of financial inclusion and ultimately reduce the size of the informal economy:

1. To develop trust among the local population in the financial institution, the regulators need to develop effective **marketing strategies**. The marketing strategy should use multiple channels to reach the financially excluded population, including, social media, community events, print media advertisements, and radio advertisements. Regulators should also cooperate with local organizations, such as community centers and education institutes, to reach potential customers. The content of the marketing strategy should aim at providing education on financial topics which includes investing, saving, and budgeting. Moreover, education on the Islamic mode of financing is also necessary to encourage the fraction of the population towards financial services who cite religious/cultural reasons for not availing of financial services. It is important that the target areas should be selected on the basis of their potential in supporting economic growth.

2. There is a need to **increase the financial inclusion target for woman** from 25% if the government intends to achieve a 50% financial inclusion target. The target rate set under the NFIS is very low as compared to other developing economies like Nigeria which under their own financial inclusion strategy has set the target of 60% for woman financial inclusion and achieved an overall financial inclusion of 45%.
3. According to the regression results, credit reforms do not tend to impact the decision of informal economy participants towards the formal sector. According to the Gallup report "*Access to Credit in Pakistan*" around 95% of the overall borrowing occurs in the informal sector. **The short interest rate cycle** is one of the major issues as it makes financing long-term borrowing difficult. Keeping interest rate low for a longer period of time will make long-term financing easier and encourage economic agents toward the formal sector. Moreover, during low interest rate environment the banks are also encouraged to raise their financing to the private sector, including SME and agriculture, in search for sustaining their interest based profits.
4. There is also a need to **develop credit histories** to reduce information asymmetry between financial institutions and borrowers. This can be achieved by expanding the outreach of the credit bureaus by covering the transactions made for utility and cellphone bills. This will be helpful for resolving the collateral issues which will encourage the local population towards the formal sector.

5. There is also a need to promote **cash-flow-based lending** in Pakistan as it will adequately resolve collateral issues for small-scale borrowers who lack valuable assets that can be deposited as collateral against a bank loan.
6. Increasing **investment in the Fintech sector** is necessary to provide a less costly and alternative source of financial services to the local population in order to encourage them towards the formal sector. Promoting the culture of venture capital investment for the fintech sector is important which, in turn, requires a supportive regulatory environment, a strong fintech ecosystem, and marketing strategies promoting Pakistan as a lucrative destination for fintech investment.
7. Ease in **capital requirements** to give more room to the commercial banks to lend to the agriculture and SME sector. At present, the capital requirement is set at 11.9% of the risk-weighted assets, i.e., above the international benchmark of 10%. Reducing capital requirements will allow banks SMEs and Agriculture financing for seeking profits and worry less about meeting the regulatory capital requirement.

REFERENCES

Ahmed, M., & Ahmed, Q. M. (1995). Estimation of the black economy of Pakistan through the monetary approach. *The Pakistan Development Review*, *34*(4), 791-807.

Antunes, A. R., & Cavalcanti, T. V. D. V. (2007). Start up costs, limited enforcement, and the hidden economy. *European Economic Review*, *51*(1), 203-224.

Arby, M. F., Malik, M. J., & Hanif, M. N. (2010). The size of informal economy in Pakistan. State Bank of Pakistan, *Working Paper Series*, 33

Aron, J. (2018). Mobile money and the economy: a review of the evidence. *The World Bank Research Observer*, *33*(2), 135-188.

Ashraf, O., & Kemal, M. A. (2019). *Exploring the Determinants of Underground Economy of Pakistan* (No. 2019: 163). Pakistan Institute of Development Economics.

Becker, G. S. (1968). Crime and punishment: An economic approach. *In The economic dimensions of crime* (pp. 13-68). Palgrave Macmillan, London.

Berdiev, A. N., & Saunoris, J. W. (2016). Financial development and the shadow economy: A panel VAR analysis. *Economic Modelling*, *57*, 197-207.

Blackburn, K., Bose, N., & Capasso, S. (2012). Tax evasion, the underground economy and financial development. *Journal of Economic Behavior & Organization*, *83*(2), 243-253.

Bose, N., Capasso, S., & Wurm, M. A. (2012). The impact of banking development on the size of shadow economies. *Journal of Economic Studies*, 39, 620-638

Buehn, A., Karmann, A., & Schneider, F. (2009). Shadow economy and do-it-yourself activities: the German case. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft*, 165, 701-722.

Canh, N. P., & Thanh, S. D. (2020). Financial development and the shadow economy: A multi-dimensional analysis. *Economic Analysis and Policy*, *67*, 37-54.

Capasso, S., & Jappelli, T. (2013). Financial development and the underground economy. *Journal of Development Economics*, *101*, 167-178.

Cihak, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. (2012). *Benchmarking financial systems around the world*. The World Bank.

Contini, B. (1981). Labor market segmentation and the development of the parallel economy: The case of Italy. *Oxford Economic Papers*, 33, 18-31.

Dabla-Norris, E. R. A., & Feltenstein, A. (2005). The underground economy and its macroeconomic consequences. *The Journal of Policy Reform*, *8*(2), 153-174.

Del Boca, D., & Forte, F. (1982). Recent empirical surveys and theoretical interpretations of the parallel economy in Italy. *The underground economy in the United States and abroad, Lexington (Mass.), Lexington*, 160-178.

Del Boca, D. (1981). Parallel economy and allocation of time. *Micros (Quarterly Journal of Microeconomics)*, *4*(2), 13-18.

Della Peruta, M. (2018). Adoption of mobile money and financial inclusion: a macroeconomic approach through cluster analysis. *Economics of Innovation and New Technology*, *27*(2), 154-173.

Elgin, C., & Uras, B. R. (2013). Is informality a barrier to financial development*? SERIEs, 4*(3), 309-331.

Ellul, A., Jappelli, T., Pagano, M., & Panunzi, F. (2016). Transparency, tax pressure, and access to finance. *Review of Finance, 20*(1), 37-76.

Frey, B. S., & Weck-Hanneman, H. (1984). The hidden economy as an 'unobserved' variable. *European economic review, 26*(1-2), 33-53.

Friedman, E., Johnson, S., Kaufmann, D., & Zoido-Lobaton, P. (2000). Dodging the grabbing hand: the determinants of unofficial activity in 69 countries. *Journal of public economics, 76*(3), 459-493.

Ghosh, A., & Paul, S. (2008). Opening the Pandora's box? Trade openness and informal sector growth. *Applied Economics, 40*(15), 1995-2007.

Gulzar, A., Junaid, N., & Haider, A. (2010). What is hidden, in the hidden economy of Pakistan? Size, causes, issues, and implications. *The Pakistan Development Review*, 665-704.

Hajilee, M., & Niroomand, F. (2021). Is there an asymmetric link between the shadow economy and the financial depth of emerging market economies? *The Journal of Economic Asymmetries, 23*, e00193.

Naghavi, N., Shulist, J., Cole, S., Kendall, J., & Xiong, W. (2016). Success factors for mobile money services: A quantitative assessment of success factors. *GSMA, November.*

Guiso, L., Sapienza, P., & Zingales, L. (2004). Does local financial development matter? *The Quarterly Journal of Economics, 119*(3), 929-969.

Mai, H., & Schneider, F. (2016). Size and development of the shadow economies of 157 worldwide countries: Updated and new measures from 1999 to 2013. *Journal of Global Economics, 4*(3), 1-15.

Imamoglu, H. (2021). The role of financial development on the underground economy in regards to Europe's 2020 strategy. *Economic Systems, 45*(2), 100768.

Jacolin, L., Massil Joseph, K., & Noah, A. (2019). Informal Sector and Mobile Financial Services in Developing Countries: Does Financial Innovation Matter? *Banque de France Working papers*, 721

Johnson, S., Kaufmann, D., Shleifer, A., Goldman, M. I., & Weitzman, M. L. (1997). The unofficial economy in transition. *Brookings papers on economic activity, 1997*(2), 159-239.

Johnson, S., Kaufmann, D., & Zoido-Lobaton, P. (1998). Regulatory discretion and the unofficial economy. *The American economic review, 88*(2), 387-392.

Johnson, S., Kaufmann, D., & Zoido-Lobatón, P. (1999). Corruption, public finances and the unofficial economy, *Policy Research Working Paper Series 2169*. World Bank.

Jöreskog, K. G., & Goldberger, A. S. (1975). Estimation of a model with multiple indicators and multiple causes of a single latent variable. *Journal of the American Statistical Association, 70*(351a), 631-639.

Kar, S., & Marjit, S. (2001). Informal sector in general equilibrium: welfare effects of trade policy reforms. *International Review of Economics & Finance, 10*(3), 289-300.

Kaufmann, D., & Kaliberda, A. (1996). Integrating the unofficial economy into the dynamics of post-socialist economies. *Economic transition in Russia and the new states of Eurasia, 8*, 81-120.

Kemal, M. A. (2007). Fresh assessment of the underground economy and tax evasion in Pakistan: causes, consequences, and linkages with the formal economy.

Ashraf, O., & Kemal, M. A. (2019). *Exploring the Determinants of Underground Economy of Pakistan* (No. 2019: 163). Pakistan Institute of Development Economics.

La Porta, R., & Shleifer, A. (2014). Informality and development. *Journal of economic perspectives, 28*(3), 109-26.

Liu-Evans, G., & Mitra, S. (2019). Informality and bank stability. *Economics Letters, 182*, 122-125.

Loayza, N. V. (1996, December). The economics of the informal sector: a simple model and some empirical evidence from Latin America. *In Carnegie-Rochester conference series on public policy*, 45, 129-162). North-Holland.

MacAfee, K. (1980). A Glimpse of the hidden economy in the national accounts. *Economic Trends, 136*(1), 81-87.

Marjit, S., & Acharyya, R. (2003). *International trade, wage inequality and the developing economy: A general equilibrium approach; with 15 tables*. Springer Science & Business Media.

Medina, L., & Schneider, F. (2017). Shadow economies around the world: New results for 158 countries over 1991-2015. *Working Paper, No. 1710, Johannes Kepler University of Linz,* Department of Economics, Linz.

Medina, L., & Schneider, M. F. (2018). Shadow economies around the world: what did we learn over the last 20 years? *IMF Working Paper Series 18*(17):1

Mothobi, O., & Grzybowski, L. (2017). Infrastructure deficiencies and adoption of mobile money in Sub-Saharan Africa. *Information Economics and Policy, 40*, 71-79.

Mughal, K., & Schneider, F. (2018). Shadow economy in Pakistan: Its size and interaction with official economy.

Omri, A. (2020). Formal versus informal entrepreneurship in emerging economies: The roles of governance and the financial sector. *Journal of Business Research, 108*, 277-290.

O'neill, D. M. (1983). Growth of the underground economy, 1950-81: Some evidence from the current population survey: a study (Vol. 98). US Government Printing Office.

Pesaran, M. H., & Shin, Y. (1995). An autoregressive distributed lag modelling approach to co-integration analysis.

Pesaran, M. H., & Smith, R. (1995). Estimating long-run relationships from dynamic heterogeneous panels. *Journal of econometrics*, *68*(1), 79-113.

Portes, A. (1996), The informal economy: Perspectives in Latin America, *Exploring the Underground Economy, W.E. Upjohn Institute for Employment Research, Kalamazoo*, pp. 147–165.

Quintin, E. (2008). Contract enforcement and the size of the informal economy. *Economic Theory*, *37*(3), 395-416.

Ramzan, Samreen. (2013). Determinants of Tax Revenue and Role of Informal Sector in Pakistan. PIDE

Salem, M. B., & Zaki, C. (2017). Revisiting the impact of trade openness on informal and irregular employment in Egypt. *Journal of Economic Integration*, *34*(3), 465-497.

Schneider, F. (2005). Shadow economies around the world: what do we really know? *European Journal of Political Economy, 21*(3), 598-642.

Schneider, F. (2007). Shadow Economies and Corruption All over the World: New Estimates for 145 Countries. *Economics–the open access, Open Assessment E-Journal, Kiel Institute for the World Economy, 1*(9).

Schneider, F., & Enste, D. H. (2000). Shadow economies: Size, causes, and consequences. *Journal of Economic Literature, 38*(1), 77-114.

Schneider, F. & Enste, D. (2002). The shadow economy: Theoretical approaches, empirical studies, and political implications. Cambridge (UK): Cambridge University Press.

Schneider, F., & Neck, R. (1993). The development of the shadow economy under changing tax systems and structures: Some theoretical and empirical results for Austria. *FinanzArchiv/Public Finance Analysis*, 344-369.

Schneider, F., Buehn, A., & Montenegro, C. E. (2010). New estimates for the shadow economies all over the world. *International Economic Journal, 24*(4), 443-461.

Shrestha, M. B., & Bhatta, G. R. (2018). Selecting appropriate methodological framework for time series data analysis. *The Journal of Finance and Data Science, 4*(2), 71-89.

Straub, S. (2005). Informal sector: the credit market channel. *Journal of Development Economics*, *78*(2), 299-321.

Svirydzenka, K. (2016). Introducing a new broad-based index of financial development. *IMF Working Paper Series*, 16/5.

Syed, A. A., Ahmed, F., Kamal, M. A., & Trinidad Segovia, J. E. (2021). Assessing the role of digital finance on shadow economy and financial instability: An empirical analysis of selected South Asian countries. *Mathematics*, *9*(23), 3018.

Tanzi, V. (1980). The underground economy in the United States: estimates and implications. *PSL Quarterly Review*, *33*(135).

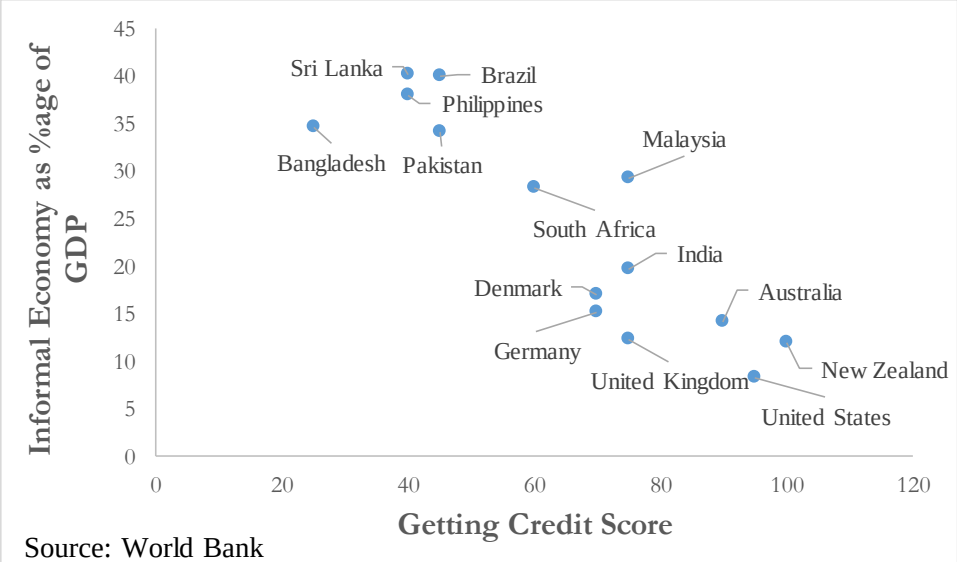
Tanzi, V. (1983). The underground economy in the United States: annual estimates, 1930-80. *Staff Papers*, *30*(2), 283-305.

Yoo, T., & Hyun, J. K. (1998). International comparison of the black economy: Empirical evidence using micro-level data. *Unpublished paper*, 1930-80.

Zellner, A. (1970). Estimation of regression relationships containing unobservable independent variables. *International Economic Review*, 441-454.

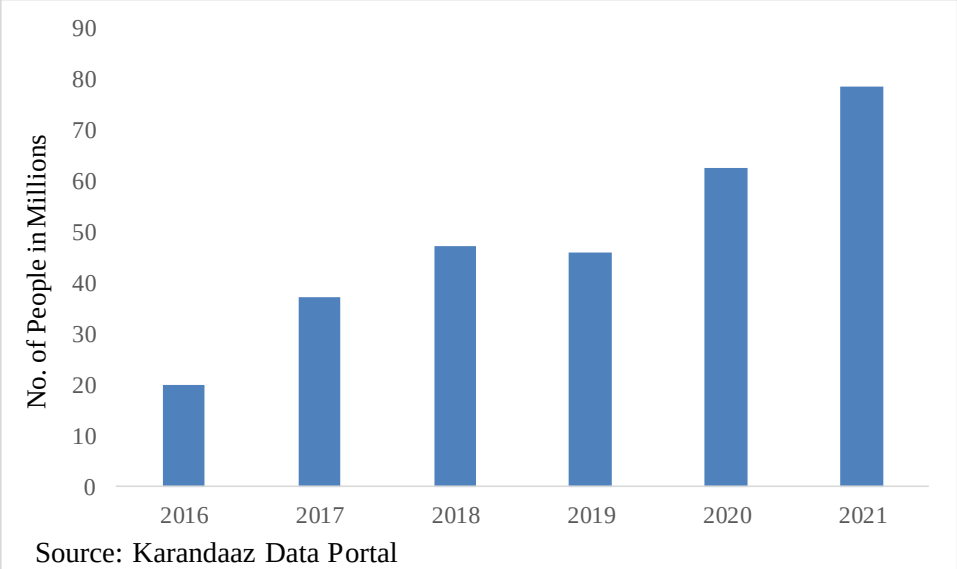
APPENDICES

Appendix A: Cross-country comparison scatter plot



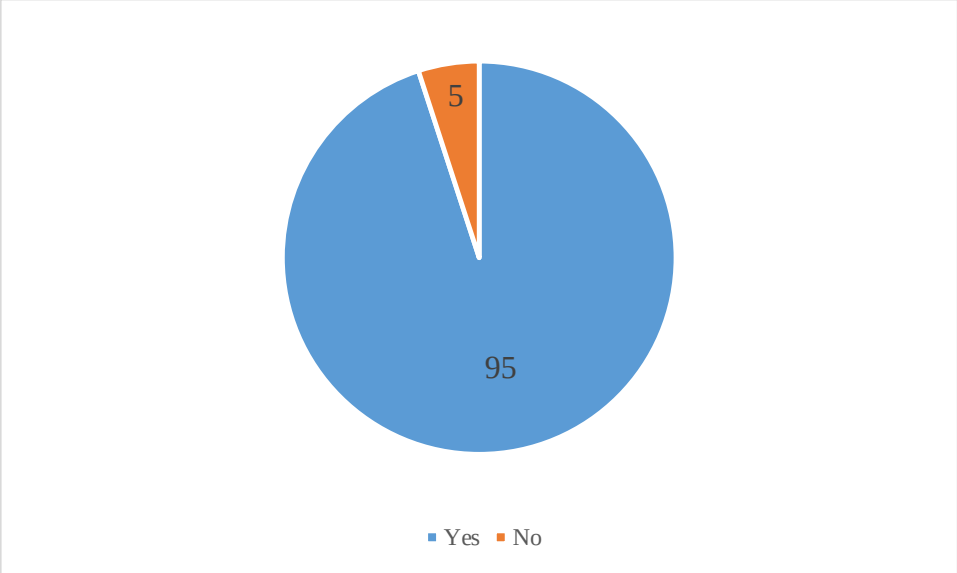
Source: World Bank

Appendix B: Number of Mobile Accounts

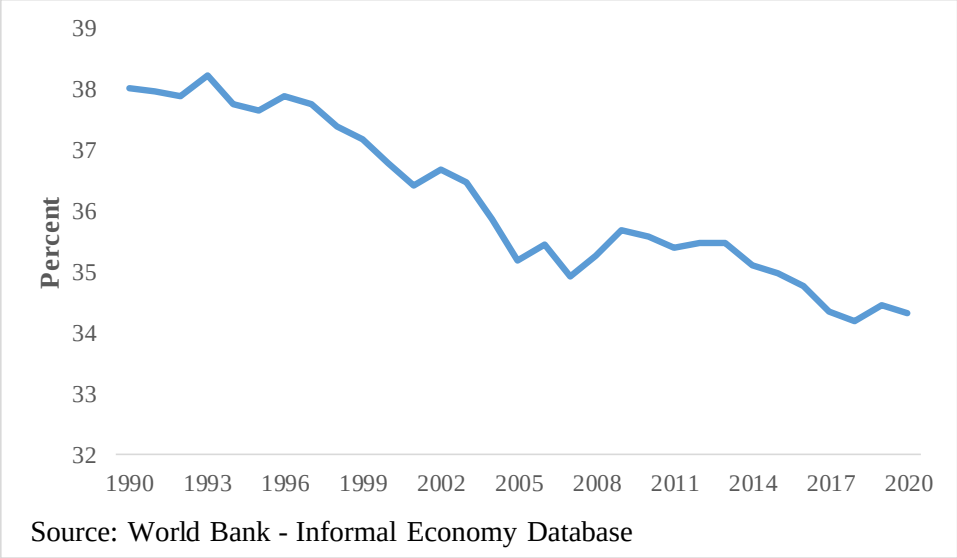


Source: Karandaaz Data Portal

Appendix C: Responses – Is the Informal Economy a major issue in Pakistan?

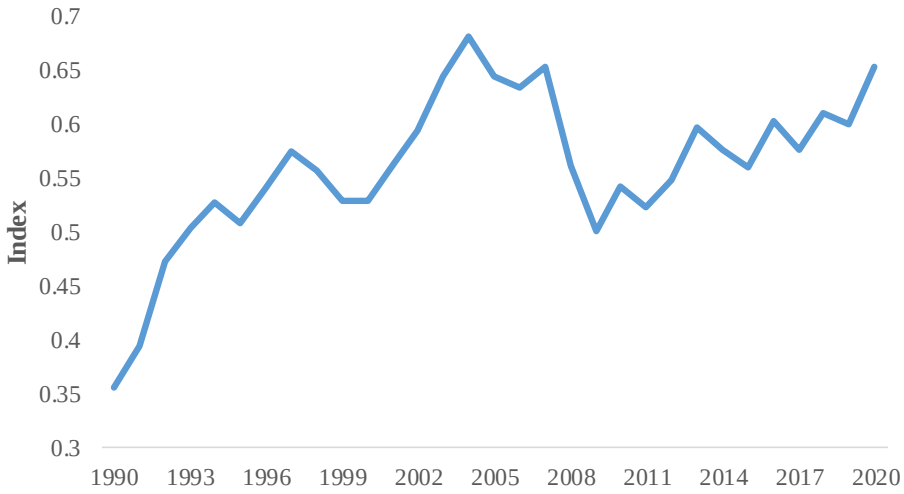


Appendix D: Informal Economy as percentage of GDP



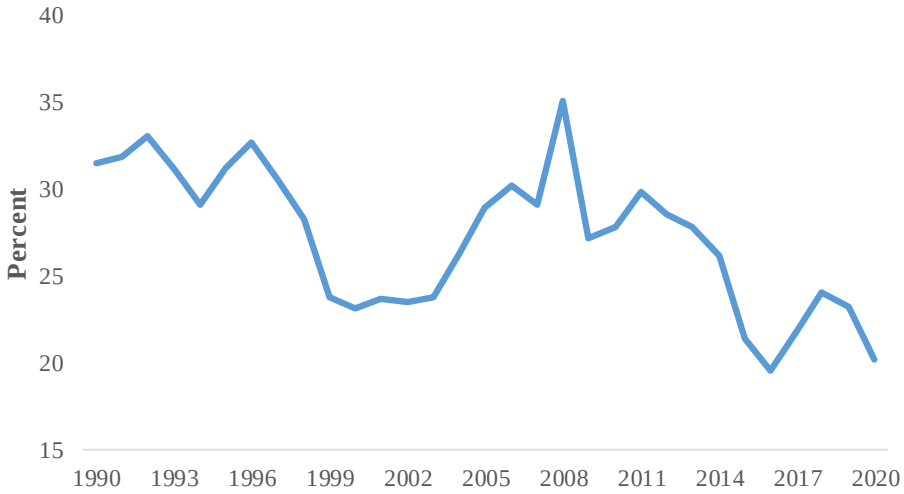
Source: World Bank - Informal Economy Database

Appendix E: Financial Development Index



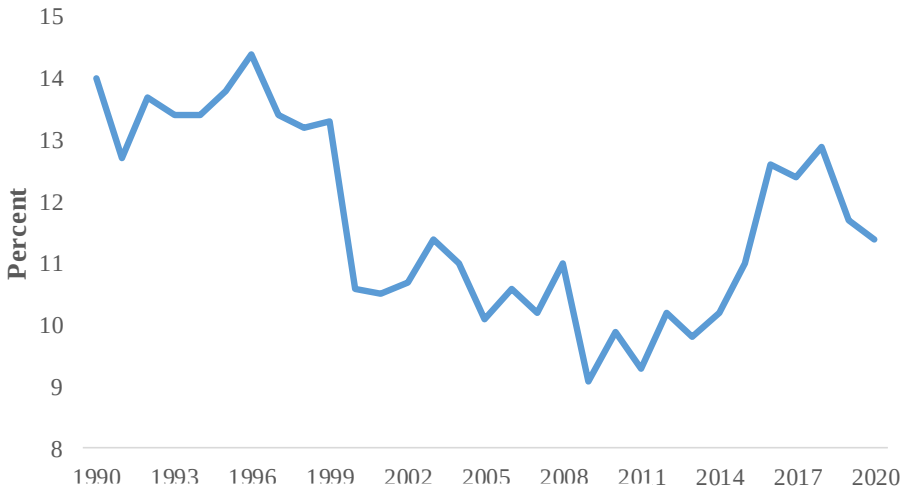
Self Estimates

Appendix F: Trade Openness as a percentage of GDP



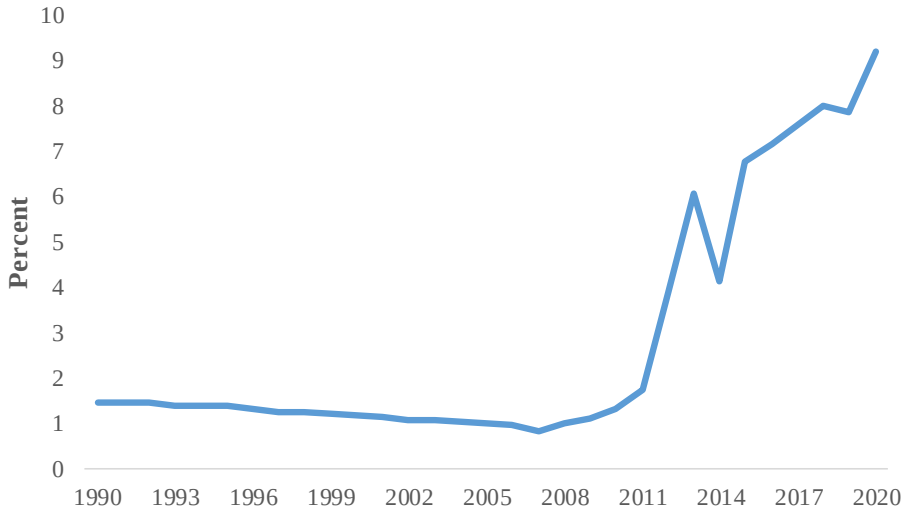
Source: Pakistan Bureau of Statistics

Appendix G: Tax Burden as percentage of GDP



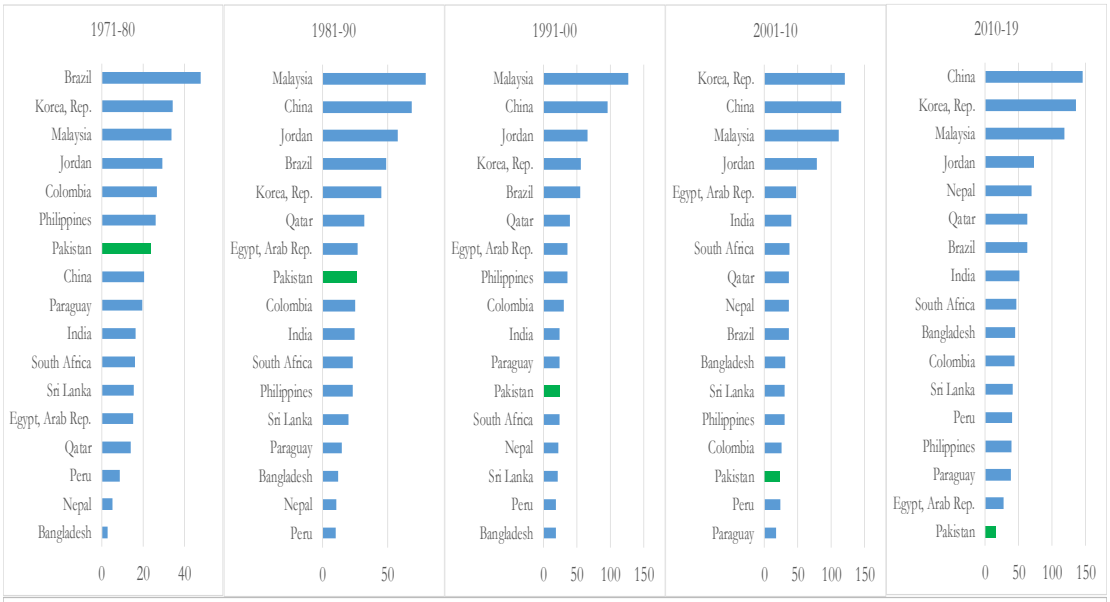
Source: Pakistan Economic Survey

Appendix H: Unemployment Rate



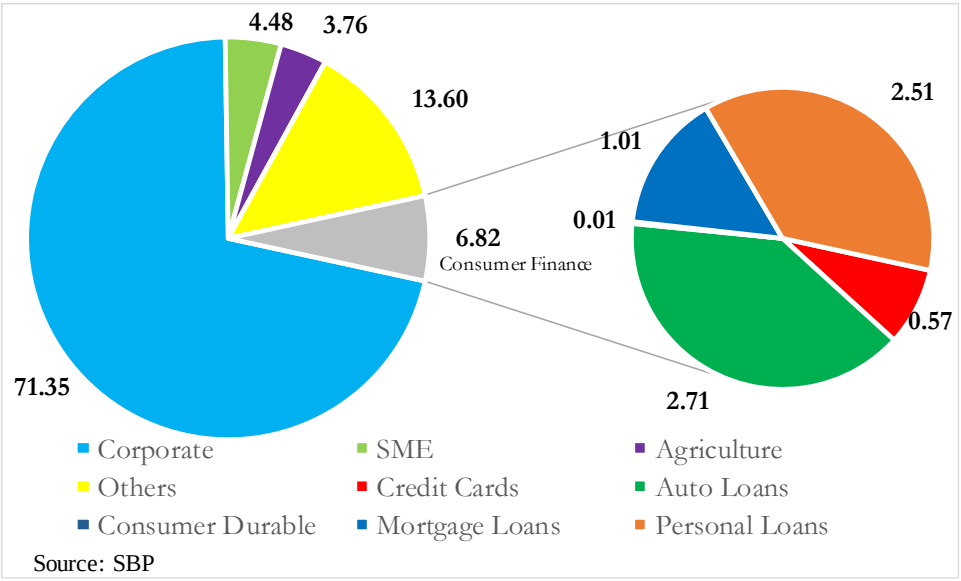
Source: Pakistan Economic Survey

Appendix I: Country-wise Private Sector Credit as a percentage of GDP



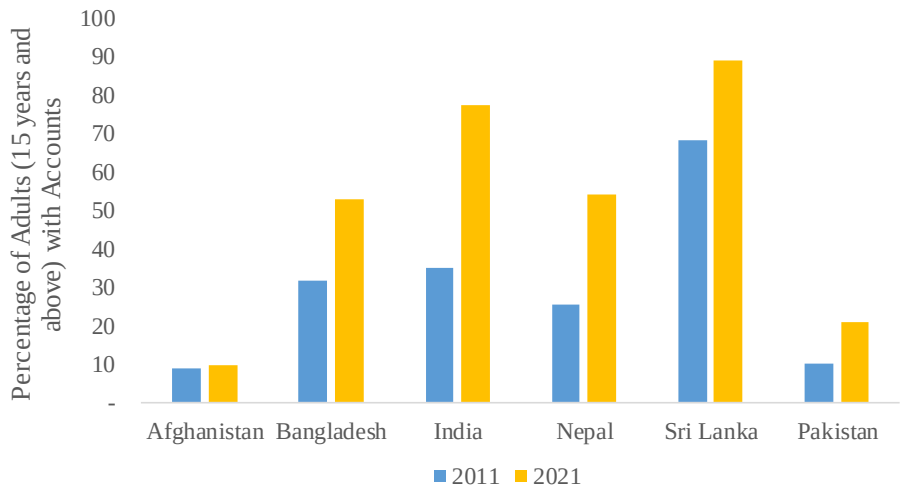
Source: World Bank

Appendix J: Segment-wise Distribution of Private Sector Credit



Source: SBP

Appendix K: Financial Inclusion country-comparison



Source: Global FINDEX Database