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# A Time Series Analysis of Financial Sector Development of Pakistan

***ABSTRACT***

This article empirically investigates the contributing factors of Pakistan's financial sector by using time series data from 1973 to 2019. Several studies discuss the role of financial development in explaining economic activities, but the literature on the determinants of financial sector development is an infant in Pakistan. This study is an attempt in this way. Therefore, we allow structural breaks endogenously to avoid spurious relationships among the variables. Notably, we use unit root tests which allow multiple breaks. This test confirms that some of the data series have different levels of integration. We find that trade openness, capital account liberalization, investment, GDP per capita, and remittances are essential variables to make the financial sector a well-functioning system. Inflation, tight monetary policy, and public debt may hurt Pakistan's financial sector.

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**Author's contribution in the article:** 1- Conceived and designed the analysis, 2- Reviewed and compiled the literature, 3- Collected the data, 4- Contributed data or analysis tools, 5- Performed the analysis, 6- Wrote the paper, 7- Financial support for the conduct of the study, 8-Other

# 1. INTRODUCTION

A country's economic growth is a delicate process that depends on the well-functioning financial sector and other factors like resource endowment, education attainment, the legal system, international trade, and religious diversity (Levine, 1997). However, empirical studies on the subject give unconvincing shreds of evidence in the context of the impact of financial development (Fufa & Kim, 2018; Batuo *et al*. 2018 Benczur *et al*. 2019). The controversy may be divided into four different lines of research. First, finance promotes economic activities (Bagehot, 1873; Schumpeter, 1911; Levine, 1997; Jalil *et al*., 2010), second finance hurts economic growth third finance follows economic growth (Robinson, 1952) and, fourth finance does not matter (Lucas, 1988). Notably, the discussion on financial sector development re-emerged in the recent great recession (Haiss *et al*., 2016; Loayza *et al*., 2017; Žukauskas & Hulsmann, 2019). It implies that the financial sector draws special attention and many economists attempt to explore its development determinants. They document that the essential determinants which may positively affect the financial sector are trade openness, capital account openness, remittances, institutional quality, legal tradition, initial endowment, education level, investment, inflation, fiscal policy, and monetary policy (Friedman,1968; Acemoglu *et al*., 2001; Huang, 2005; Chin & Ito, 2006; Huang, 2010).[1] On the other hand, inflation and public debt may hurt financial activities.

The empirical study of Huang (2005) postulates that the financial sector also depends on several economic and socio-economic factors. Notably, recent studies clearly show that the economies' financial sector is being developed by trade openness, inflation, remittance, and economic growth. Specifically, Huang (2005) points out that the differences in geographical conditions, cultural characteristics, institutional qualities, and many other macro-economic factors determine the countries' financial development.

It is also postulated in the literature that sometimes one factor can change the speed of financial sector development despite the similarities in other factors. For example, the legal traditions and practices matter a lot in England and France to determine financial activities. Similarly, Mexico and Canada, on the other hand, differ due to differences in their income level and geographical endowment. Whereas in Latin America, macroeconomic policies are responsible for differences in the financial markets. Voghouei *et al*. (2011) document that political institutions' role is vital in England and Mexico.

This backdrop motivates a researcher to investigate the determinants of a developing country's financial sector like Pakistan. Several developing countries, including Pakistan, launched financial reforms over the last 20 years. Indeed, developing countries' financial sector becomes healthy over the last fifteen years. For example, the banking sector's health measured by Non-Performing Loans (NPLs) is improved in developing countries. The stock markets become regularized, mutual funds and clearinghouses are established. Unfortunately, no scientific study was conducted on the determinant of any developing country's financial sector development.

Therefore, this study is an attempt to fill this research gap. Interestingly, Pakistan is an excellent candidate to investigate for several reasons. For example, many financial reforms were introduced in the early 1990s. Then the financial sector of Pakistan saw a road of success. Now, Pakistan's financial sector can absorb the severe financial crises like the financial crises of 1997 and financial crises of 2007-08. Therefore, Pakistan is a good case study for investigating the determinant of the financial sector for giving a roadmap to other developing countries in financial reforms.

This study explores the importance of the financial sector, the macroeconomic variables that promote the financial sector that is the banking sector in Pakistan over the period 1973-2019. We shall use Auto-

[1] Rajan and Zinglaies (2003) argue that even economic openness does not promote financial activities in the presence of strong incumbents.

Regressive Distributed Lag Models (ARDL). This estimator handles the time series issues more smartly than any other finding relationship in the time-series data. This approach's estimates are consistent even in the case of a small sample size.

Pakistani financial sector includes banking institutions, stock exchange markets, non-banking financial institutions (NBFIs), and insurance companies. Among all other financial institutions, the banking sector of Pakistan remains dominant. 88 % of the financial sector and the rest of the 12 percent consist of the whole non-banking financial system. Therefore, the present paper deliberately focuses on the system's banking part. The prominent literature measures the bank-based financial sector with liquid liabilities deposited in the banks, credit to the private sector, and commercial bank assets to central bank assets ratio.[2] Generally, there is good harmony among these indicators, and they move in the same ways. However, the case of Pakistan is different. The liquid liabilities are continuously moving up and, on the other hand, the credit to the private sector witnessed several ups and downs. Specifically, the liquid liabilities substantially increased, and the credit to the private sector witnessed a historic dip over the last 15 years (see Figure 1). Therefore, a single indicator will not reflect the exact picture of Pakistan's financial sector. Keeping this backdrop in view, we construct an index to measure financial sector development. This index covers both sides of the financial sector of Pakistan.

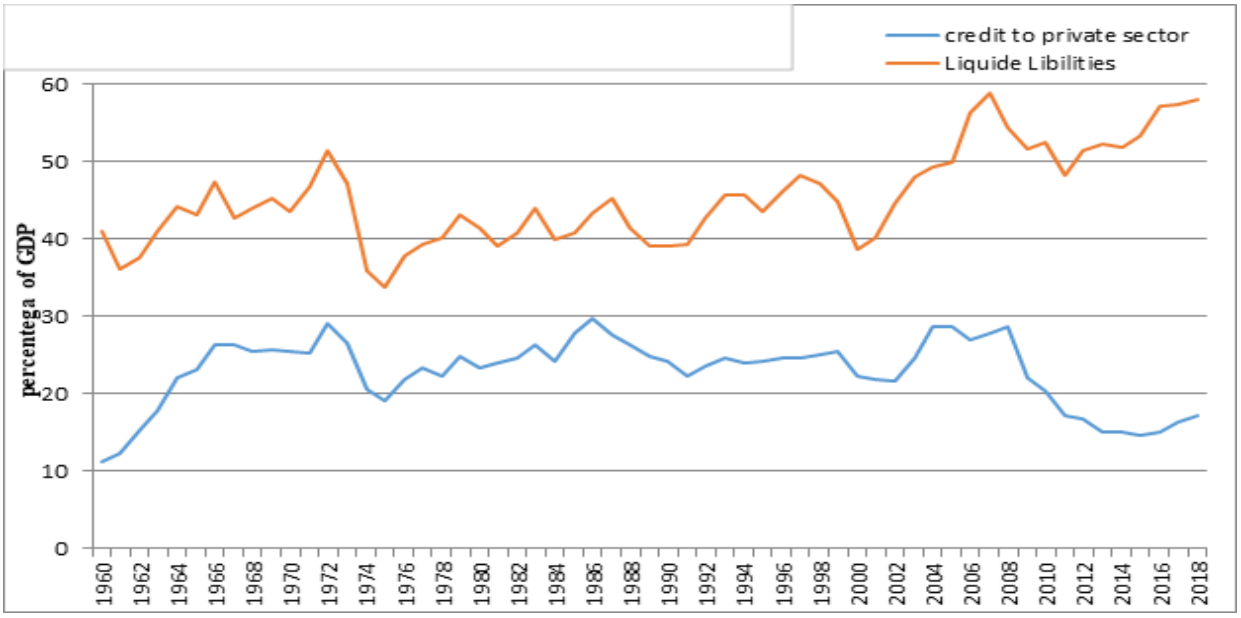


**Figure 1:** Credit to the private sector and liquid liabilities
Source: Author's calculation and Data is taken from World Development Indicators

The rest of the study is organized conventionally. The literature review is presented in Section II. Section III provides a brief overview of the financial sector of Pakistan. Section IV sets the analytical framework. The construction of variable and data sources is discussed in section V. Section VI and section VII discuss the empirical results and conclude the article.

## 2. LITERATURE REVIEW

As mentioned earlier, the recent surge of the papers in finance-growth nexus literature documents that the FD is an exogenous source of the economies' economic activities. On the other hand, some equally essential

[2] The detailed of these indicators will be discussed in detail in the later part of the paper.

studies clearly show that some essential macro-economic variables are developing the financial sector. Specifically, Huang (2005) points out that many economic and non-economic variables may affect the financial sector's development.

Therefore, the empirical literature on the FSD gets a significant turn and examines the FD determinants. In this regard, the steppingstone is liberalization, which can affect financial development through various channels. For example, Shaw (1973) highlights that financial liberalization can foster the financial sector and then economic activities by increasing its productivity. Fry (1995) argues that reserve and liquidity requirements are a tax on financial intermediation. This thinking leads to a decrease in the financial sector's size by increasing the loan interest rate and deposit rate gap.

Furthermore, the banking sector liberalization might decrease financial restriction and the capital premium's external cost, promoting financial development and investment. Stulz (1999) believed that capital liberalization allows foreign and domestic agents to invest in different portfolios. It will reduce the capital cost and increase the availability of funds that deepen the financial sector level. Financial liberalization is the lowering of credit control, interest rate deregulation, banking sector independence, banking sector privatization, and free entry in the financial markets. Trade openness and trade liberalization may be another pivotal determinant of financial sector development. Specifically, Svaleryd and Vlachos (2002) and Law and Habibullah (2009) document that trade openness may affect financial development.

The classic papers of Greenwood and Smith (1997) among others find that financial activities have some vital role in channelizing the investment to its maximum use.[3] More vocally, Levine and Renelt (1992) document that the increased and channelized investment spurs the economic activities, promoting financial development. More recently, Huang (2010) finds that external finance demand increases due to increased private investment. This channel affects financial intermediation by encouraging savers to deposits in banks and productive business instead of unproductive assets. Huang (2010) argues that financial intermediaries favoring productive investment induce portfolio allocation and investments. It offers easing liquidity risk, liquidity to savers, reducing transaction cost, and exerting corporate control.

Boyd *et al*. (2001) note that the country's inflation may also play a role in determining financial activities. However, this line of research's empirical literature is not clear about the link between financial activities and inflation. The literature finds both linear and non-linear relationships between inflation and finance. For example, Boyd *et al*. (2001) note that price stability has a strong and positive effect on financial activities. Similarly, Aggarwal *et al*. (2011) and Bittencourt (2011) document that the rise in inflation may depress financial intermediaries' activities and promote channelizing the saving in real assets.

Furthermore, the recent financial crises of 2007 and the current debt crises in the Eurozone have turned policymakers' attention towards fiscal policy's role in financial activities. Caballero and Krishnamurthy (2001) conclude that expansion of fiscal policy reduces the country's assets' liquidity valuation because a rise in government expenditures crowds out private investment. Keeping this in view, Hauner (2009) examines the relationship of public debt with financial development and concludes that the concept of lazy banks besides the safe banks' view explains the positive role of public debt to financial debt. Furthermore, Ismihan and Ozkan (2012) provide the theoretical framework on public debt's role in financial development and concludes that public debt negatively affects financial development.

Not even fiscal policy but monetary policy also has crucial implications for the financial markets, leading to economic growth (Patrick, 1966). Patrick (1966) believes that the monetary and financial authorities should focus on the policies that may attract the savers to invest in the financial instruments. However,

[3] Some important theoretical papers of Beneivenga *et al*. (1999), Greenwood and Jovanovic (1990), Diamond and Dybvig (1983) may be referred in this context.

Carranza *et al*. (2006) point out that the monetary policy can set only the short-term interest rates to affect inflation and economic growth. Therefore, from the point of view of Carranza *et al*. (2006), we can extract that monetary policy may effectively explain the variations in financial development through interest rate channels and credit channels.

Remittances are funds expected from migrants working abroad and, interestingly, are proved to be less volatile than official aid and foreign direct investment. Besides this, the remittances are also crucial for FD due to its stable financing nature. Saca and Caceres (2006) find that remittances can cause economic activity contraction due to decreased saving. Azam and Guberi (2006) and Chami *et al*. (2003) find the ambiguous effect of remittances on economic growth, that is, it hurts growth if the studies focus on labour supply in response to remittances. On the other hand, the effect is positive in finance and remittances nexus (Giuliano & Ruiz-Arranz, 2009; Toxopeus & Lensink, 2006; Aggarwal *et al*., 2011).

Similarly, Gupta *et al*. (2007) find that remittances positively affect FD. The money transfers for migrants facilitate the smoothening of budget constraints households. Furthermore, it provides an opportunity for the household to be a part of the formal financial sector through their small savings, and thus the improvement in the financial sector can be gained. The same is right in the case of Bangladesh (Chaudhury 2015). Therefore, remittances can be considered a stable source of financial sector development.

Several necessary studies consider institutions' role as an essential determinant of financial activities. Specifically, the legal environment has been identified as essential for financial markets' essential functions. More clearly, the theory of legal region in the context of financial sector development is designed by La Porta *et al*. (1998) and is applied by Beck *et al*. (2000). They explain the property rights and working of the financial sector in the backdrop of the colonization process. La Porta *et al*. (1998) explain that it is the legal and regulatory environment in financial transactions responsible for FD differences. Mayer and Sussman (2001) also find that prudential regulations and practices like accounting standards, insurance, and regulation concerning information disclosure play a key role in developing financial markets.

Huang (2005) and Arif. and Rawat (2019), finds that political liberalization promotes financial development by limiting the leading group's effect over the policymakers. It helps in promoting political rights and civil liberties. Chin and Ito (2006) conclude that the development of the general legal system endorsed FD through financial liberalization. However, Modigliani and Perotti (2000) and Rajan and Zingales (2003) document that banking finance is used in countries where contract enforcement is weak, collateral is emphasized more. Yang (2011), among others like, Selçuk (2019) and Khan *et al*. (2020) note that democracy props up the financial market because of its institutional features such as checks and balances and political competition.

## 3. A QUICK REVIEW OF FINANCIAL SECTOR OF PAKISTAN

According to the adaptions policies, Pakistan's banking sector developments are divided into three main eras. These are, first from 1947 to 1973, second from 1973 to 1990 and third from 1991 to today. Pakistan's financial sector started its journey with only 195 branches of few banks without any central bank in 1947.[4] The government's first step to regulate the existing banking system and get its assets from the Reserve Bank of India (RBI). The next was establishing a central bank, and it was established on July 1, 1948, named as state bank of Pakistan (SBP).[5] By the end of 1973, with the help of dynamic policies of SBP, the banking

[4] At that time current Bangladesh was also the part of Pakistan and known as East Pakistan. Therefore, we may easily guess that how the financial sector was developed in in early 1950s.

[5] Pakistan came into being as of result of partition of Indian sub-continent, which was a colony of British Empire till 13th August 1947.

sector expanded from 195 branches to 3233 domestic branches (of 14 banks) and 74 branches of foreign banks.

In 1974, the nationalization policy was adopted to efficiently regulate the banking sector for more efficient financial capital utilization. Under this nationalization policy, 14 private commercial banks were merged into five nationalized commercial banks (NCBs). These NCBs expanded their branches to remote areas of the country for providing nationwide financial services to underdeveloped areas for their development. Pakistan banking council (PBC) was also established under the nationalization act of 1974 to regulate the affairs of NCBs. The objectives of attaining commercial banks' efficiency and growth and accelerating the competition to develop a more diversified banking system by nationalizing commercial banks could not be met. It was witnessed that the financial sector served mostly corporate business, incumbents, and politicians by the end of the 1980s. The board of directors and chief executive officers of the banks were not independently appointed on a merit basis.

Consequently, banking activities were not always commercially motivated. Therefore, a considerable amount was a flight out of the financial system. This was termed as bad loans and NPL. It was safely claimed that the big banks were not in control of their purposes during the late 1970s and 1980s.

This paved the way for financial sector reforms of the 1990s in Pakistan. These reforms covered seven important financial liberalization areas: financial institutions, domestic debt management, monetary sector management, banking law & regulations, foreign exchange & liabilities, and developments of the capital market.

The initial step of the financial reforms involved privatizing nationalized commercial banks. Under these reforms, PBC was demolished, and SBP was given full autonomy to make and implement regulatory, monetary, and supervisory policies for enhancing the efficiency of the financial institutions. Laws were amended for the recovery of non-performing loans. Capital accumulation was redirected by lowering the interest rate on financial instruments. Commercial banks and NCBs were directed to downsize their staff and close non-profit branches to reduce operational and administrative expenses. In this era, commercial banks and different specialized banks, and microfinance banks started their operation, making the banking sector of Pakistan more efficient by providing financial services in almost every segment and sector of the economy.

Many indicators are devised to assess the health of soundness of any country's financial sector. For example, we can discuss several adequacy ratios, earnings ratios, quality of assets, size of liabilities, and vulnerability indices. However, the discussion of all these indicators is beyond the focus. We shall concentrate on few indicators like liquid liabilities and the credit to the private sector. The core reason for selecting these two indicators is that they are directly connected with economic activities.

It is argued in the literature that liquid liabilities represent an essential indicator of the development of the financial sector development. It reflects the depth of the financial sector. However, most of the time liquid liabilities could not be converted into credit to the private sector. If the government sector starts borrowing from the banking sector to match its expenditures, then the credit for the private sector will be shrunk. In other words, the public sector borrowing crowd out the private sector. So, the liquid liabilities will not contribute to economic growth but generate inflationary pressure on the economy. In this case, liquid liabilities are not a good indicator of FSD. Hence, credit to the private sector will be considered (see figure 1).

The figure can depict an exciting story. The liquid liabilities and credit to private follow each other till 2004. However, both variables decouple after 2004. The liquid liabilities keep rising with some fluctuations, but the private sector's credit decreases from 2004. This was when the public sector borrowing was

increased to match the fiscal deficit. The banking sector chooses to lend to the government due to its safe placement. However, the public sector is not suitable for FSD. It contributes to inflation instead of economic growth.

Interestingly, liquid liabilities show that FSD is improving and, on the other hand, credit to the private sector is posing the other side of the picture. Therefore, one cannot rely on one variable to measure the FSD of the country. This phenomenon is evident in figure 1. There was a notable increase in liquid liabilities from 2010 onward, but credit to the private sector decreased. Therefore, the credit to the private sector is a more relevant indicator. The credit to the private sector does not show a very good picture. It passes through several phases of increase and decrease (See Figure 2).

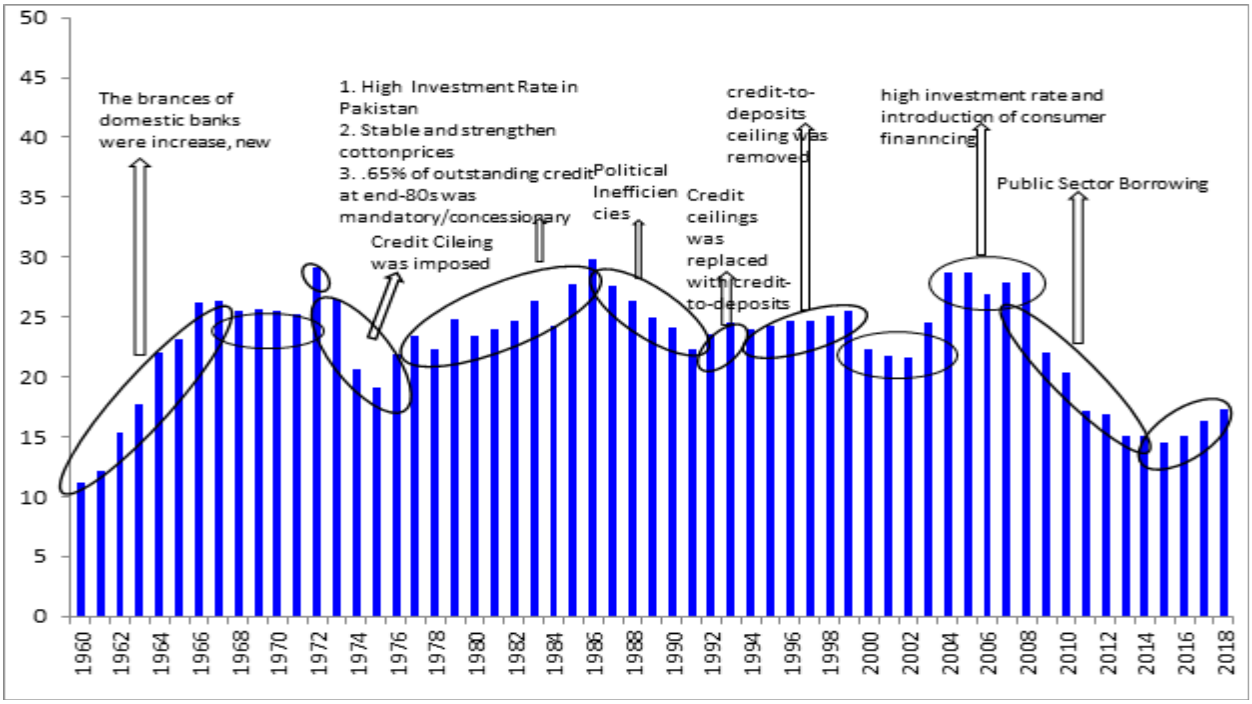


**Figure 2:** Credit to the private sector (% of GDP)
Source: Author's Calculation and Data is taken from World Development Indicators

## 4. ANALYTICAL FRAMEWORK AND ESTIMATION METHODOLOGY

Many policy and macro indicators may be referred to, explaining the financial sector activities. For example, McKinnon (1973) discusses that financial repression may hurt FSD and economic activities. Therefore, liberalization is vital to get a well-functioning financial sector. Similarly, Klein and Oliviei (1999); Stulz, (1999); Claessens *et al*. (2001), and Stiglitz (2000) have a stance that liberalization creates a favorable environment for investment by putting pressure for financial sector reforms. Levine (2001) also adds that financial markets liquidity is enhanced due to removing the restriction on international portfolio flows. Then Braun and Raddatz (2006) and Law and Habibullah (2009) by empirically investigating the interest-group-theory (IGT) of Rajan and Zingales (2003) point out that trade liberalization policy is beneficial for the financial sector as a whole instead of a group of incumbents. Badi *et al*. (2009) add that liberalization, even in the loose version, is vital for FSD.

Besides policy variables, the literature suggests that worker's remittance (Chami *et al*. 2003; Giuliano & Ruiz-Arranz, 2009; Azam & Guberi, 2006; Toxopeus & Lensink, 2006; Gupta, 2007), the institutions (La Porta *et al*., 1998; Beck *et al*., 2000; Acemoglu *et al*., 2001; Huang, 2005), and good governance should

also be included in the financial development function. Therefore, keeping all arguments in view, we specify equation 1 following Huang (2005) and Huang (2011).

$$fd_t = \alpha_0 + \beta_0 rem_t + \gamma_0 gdp_t + \theta_0 trade_t + \omega_0 invest_t + \rho_0 prices_t + \lambda_0 X_t + \mu_t \qquad (1)$$

where $fd$ is financial development indicator; $rem$ is worker's remittance, $gdp$ is the size of the economy, $trade$ is trade openness, $invest$ is an investment, $prices$ is a measure of inflation, $X$ is a vector of control variables $\mu_t$ is an error term.

The Time-series estimation procedure starts with testing stationarity issues in the data generating process. It is well known that most macroeconomic measures have non-stationarity properties, therefore a well-recognized cointegration technique is named the autoregressive disturbed lag model (ARDL). It is well established in the time-series literature that ARDL has advantages over the other cointegration tests (see Jalil *et al*. 2010). For example, this cointegration technique may be used in the case of I(0), I(1), or any other position between I (0) and I (1) that is partially cointegrated series This approach may take the optimal lag number during the general to the specific process of modelling. Pesaran and Shin (1999) point out that this technique doesn't allow inconsistent estimates in a small data span.

Furthermore, Ang (2010) documents that we explicitly take the exogenous variables in the ARDL framework; therefore, the endogeneity may be tackled. Importantly, we may face a small sample, different integration orders, and endogeneity in Pakistan's financial data. Therefore, ARDL would be a better choice in our case. The ARDL framework may suggest the estimable equation:

$$\begin{aligned}\Delta fd_t = {} & \alpha_0 + \alpha_1 \textstyle\sum_{i=1}^{p} \Delta fd_{t-i} + \alpha_2 \sum_{i=1}^{p} \Delta rem_{t-i} + \alpha_3 \sum_{i=1}^{p} \Delta trade_{t-i} + \alpha_4 \sum_{i=1}^{p} \Delta invest_{t-i} + \\ & \alpha_5 \textstyle\sum_{i=1}^{p} \Delta prices_{t-i} + \alpha_6 \sum_{i=1}^{p} \Delta X_{t-i} + \lambda_1 fd_{t-1} + \lambda_2 rem_{t-1} + \lambda_3 trade_{t-1} + \\ & \lambda_4 invest_{t-1} + \lambda_5 prices_{t-1} + \lambda_6 X_{t-1} + \varepsilon_t \end{aligned} \qquad (2)$$

$\lambda$'s are the long-run parameters on the independent side. The $X_t$ is the vector of some other controlled variables. The short-run dynamics are estimated through an error correction mechanism in the ARDL procedure based on the stationarity data series. If there is a level relationship among the variable existing in a longer run, the following equation will show the short-run results and error correction term.

$$\begin{aligned}\Delta fd_t = {} & \beta_0 + \textstyle\sum_{i=1}^{p} \delta_i \Delta fd_{t-i} + \sum_{i=1}^{p} \phi_i \Delta rem_{t-i} + \sum_{i=1}^{p} \lambda_i \Delta trade_{t-i} + \sum_{i=1}^{p} \theta_i \Delta invest_{t-i} + \\ & \textstyle\sum_{i=1}^{p} \eta_i \Delta prices_{t-i} + \sum_{i=1}^{p} \varsigma_i \Delta X_{t-i} + \alpha ECM_{t-i} + U_t \end{aligned} \qquad (3)$$

lower coefficient of ECM implies a lower speed of adjustment of the economy after an exogenous shock.

## 5. DATA AND VARIABLES

There is no consensus among the researchers for measuring the financial sector. It can be measured through size, structure, and efficiency. King and Levine (1993) employ money supply measured by M2 to nominal GDP ratio representing the financial depth. Nevertheless, Demetriades and Hussein (1996) point out that in developing economies, due to cash-based transactions; the currency in circulation is a significant chunk of the money supply. Therefore, the insinuation of increasing M2 is the monetization of the economy instead of financial depth. Therefore, the variable liquid liabilities (denoted by *Lly*) are a better indicator of the financial sector's deepness. The liquid liabilities mean that the currency in circulation and the deposits in banking institutions and other non-banking financial institutions. However, possibly the deposited savings are not properly allocated for economic activities like the credit extended to the private sector and others. Therefore, the credit to the private sector (denoted by private) that measures the financial sector structure is a better indicator (Beck *et al*., 2000). Levine (1997) proposes another indicator that may be another

measure of the change in developing countries' financial sector structure. It is the ratio of assets of commercial banks to the assets of the central bank (denoted by *btot*) of the country.

It implies that there is no consensus on using a single measure of $fd$ which may truly depict the meaningful picture of the financial sector. Recap the discussion in Figure 1 and Figure 2 as well. Therefore, the present study uses a composite index for the financial sector development developed by the principal component analysis study and other indicators. It combines three indicators *Lly*, private and *btot* through factor analysis. The high correlations among private, *btot*, and *Lly* are evidence that all the indicators carry some standard information. In this situation, Creane *et al*. (2003) suggest the calculation of principal components for generating a single series for all these selected financial indicators.

Table 1: The Construction of FD by Using PCA

| Principal Component | Eigenvalues | Percentage of Variance | Cumulative |
|---|---|---|---|
| 1 | 2.5314 | 0.8115 | 0.8115 |
| 2 | 0.4231 | 0.1361 | 0.9476 |
| 3 | 0.0461 | 0.0524 | 1.000 |
| Variable | Factor Loadings | Communalities | Factor Scores |
| private | 0.7246 | 0.5261 | 0.3521 |
| *btot* | 0.3113 | 0.6127 | 0.3361 |
| *Lly* | 0.5459 | 0.5621 | 0.2985 |

Source: Authors' Calculations

Seventy-one percent of the standardized variation is explained by the first principal component (see Table 1). Therefore, the first principal component is more critical for measuring $fd$. We also provide the individual contributions of the relevant variables by factor score. The variable private contribute 35 percent in the first principal component, *btot* contributes 36 percent, and *Lly* contributes 28 percent.

The worker remittance comes and is reported into the host country in foreign currency. Therefore, it is multiplied with the exchange rate to get the local currency unit amount. Export plus import to GDP ratio for trade openness is used. For the capital account liberalization (denoted by *cal*) foreign direct investment and foreign portfolio investment over GDP is used following Seetanah *et al*. (2009) and Chin and Ito (2006). The rate of consumer price index change is being used as a proxy for inflation following the standard literature (Seetanah *et al*., 2009; Huang, 2011; Hauner, 2009; Boyd *et al*., 2001). Gross fixed capital formation is taken to proxy the investment indicator following the standard literature. The economy's size is considered an essential determinant of the higher level of financial services (Levine, 1993; & Baltagi *et al*., 2009). Several indicators are available to capture the economy's size like the level and the growth rate of gross domestic product (GDP) and the level of per capita GDP. However, per-capita GDP incorporates the country's GDP and population size. Therefore, we shall use Pakistan's per capita GDP in the local currency unit following Demetriades and Hussein (1996). As McKinnon (1973) points out, financial repression may destroy the growth level by altering the prices of financial instruments, for example, foreign exchange rates and interest rates. Therefore, interest rates (denoted by *mp*) are linked with the size of the financial system. Besides, it reflects monetary policy behaviour conduction as well. All data are taken from the various issues of the Pakistan Economic Survey.

## 6. EMPIRICAL RESULTS

We start testing stationarity properties through conventional Augmented Dicky Fuller (ADF) unit root test. The test shows that some of the variables are I(1) and some others are I(0), but none of them is I(2).[6] Since

[6] The results of ADF are not presented here keeping brevity in mind. However, these are available on request.

we are using the ARDL methodology for the cointegration among the variables, we are quite comfortable with these results. However, both tests may produce erroneous results in some structural breaks in the data generating process (Perron, 1997). As we have discussed that policy decisions in financial sector reforms may produce some structural breaks of financial sector variables.

The conventional ADF fails to detect unit roots in some structural breaks in the data generating process. In this situation, several bailout packages are suggested by researchers. For example, Perron (1997) allows some exogenous structural breakthrough, a dummy variable in ADF tests. Then Zivot and Andrews (1992) determine the system's breakpoint. Notably, Clemente-Montanes-Reyes (CMR) mentioned in Clemente (1988) proposes a unit root test that allows two different models to capture the structural breaks in the underlined variables' data generating process. The first model captures the sudden change in a variable's data generating process. It is called the additive outliers model (AO). Second measures the gradual shifts in the data generating process and is called the innovational outliers model ((IO). The present study uses the CMR tests to investigate the stationarity property of the data series due to its several advantages. For example, it does not require a priori knowledge of the structural break dates.

**Table 2:** CMR Unit Root Test

| | Innovative (Outliers) | | | | Additive (Outlier) | | | |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **t-statistics** | **Time Break1** | **Time Break2** | **Decision** | **t-statistics** | **Time Break1** | **Time Break2** | **Decision** |
| *private* | 5.9286* | 1991 | 1998 | I(1) | 4.1838* | 1986 | 1998 | I(1) |
| *Lly* | 5.1783* | 1991 | 1996 | I(1) | 6.9678* | 1984 | 1986 | I(1) |
| *btot* | 4.9818 | 1983 | 1989 | I(0) | 6.9795* | 1983 | 1985 | I(1) |
| *fdi* | 4.4470 | 1991 | 1998 | I(0) | 7.1102* | 1995 | 1998 | I(1) |
| *inflation* | 5.5947 | 2001 | 2006 | I(0) | 8.5023* | 2001 | 2007 | I(1) |
| *rem* | 3.6501 | 1981 | 2000 | I(0) | 6.4516* | 1981 | 1998 | I(1) |
| *lend* | 2.7411 | 1998 | 2002 | I(0) | 5.1492* | 1998 | 2002 | I(1) |
| *invest* | 6.9841* | 2001 | 2007 | I(1) | 7.8731* | 2003 | 2007 | I(1) |
| *gdp* | 2.3239* | 2001 | 2008 | I(1) | 6.7372* | 1998 | 2008 | I(1) |
| *trade* | 6.0931* | 1998 | 2002 | I(1) | 6.9077* | 1998 | 2004 | I(1) |
| *cal* | 1.7217 | 1992 | 2000 | I(0) | 5.1101* | 1994 | 1998 | I(1) |
| *debt* | 3.2921 | 2000 | 2006 | I(0) | 7.7287* | 2003 | 2006 | I(1) |
| *deposit* | 5.4110 | 1998 | 2002 | I(1) | 6.5538* | 1998 | 2005 | I(1) |

Source: Authors' Calculations

AO model and IO model propose the contradictory model. *rem*, *btot*, *fdi*, *gdp*, *debt*, *cal*, and *deposit* are stationary at level with innovative outlier's model, while additive outlier model proposes that all variables have unit root when sudden structural breaks are allowed. Nevertheless, none of the variables is I(2). This contradictory outcome suggests that the ARDL approach will be appropriate for cointegration analysis even with the structural breaks.

The next step is to test the cointegration among the variables using the ARDL model. The standard ARDL procedure estimates equation 2 through ordinary least square (OLS) for computing the joint F-statistics (see Pesaran & Pesaran, 1997). We shall estimate several different regressions to posit a clear picture regarding the determinant of Pakistani FSD. The comparison of calculated values and critical shows strong evidence of having a long-run relationship among the under-consideration variables.

Next, we estimate the long-run coefficients through the ARDL estimator. Five regression are estimated with the natural log of private as a dependent variable in equation 2. The base model, (regression 1), shows that trade, remittances, and per-capita GDP enter the regression significantly positive. The coefficient 0.2108 of trade implies that the financial sector of Pakistan will improve 0.2108 percent by the increase of

1 percent in the measure of trade openness. The finding is in line with Baltagi *et al*. (2009). Our findings are partially in line with Rajan and Zingales (2003). Rajan and Zingales (2003) study that trade and capital's simultaneous openness is essential for FSD. At the same time, they believed that the openness of one could promote the banking sector in a relatively closed economy.

**Table 3:** F-Stats for Bounds

| | **F-statistic** | **1 percent critical bounds** | | **5 percent critical bounds** | | **10 % Critical bounds** | |
|---|---|---|---|---|---|---|---|
| | | **I(0)** | **I(1)** | **I(0)** | **I(1)** | **I(0)** | **I(1)** |
| **A:** | | | | **Credit to Private Sector Model** | | | |
| Lag 4 | 2.8160 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| Lag 3 | 6.0244 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| Lag 2 | 6.6120 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| Lag 1 | 7.1354 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| **B:** | | | | **Liquid Liabilities Model** | | | |
| Lag 4 | 2.9656 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| Lag 3 | 4.1528 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| Lag 2 | 4.5992 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| Lag 1 | 7.8892 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| **C:** | | | | **Financial Development Index Model** | | | |
| Lag 4 | 1.9137 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| Lag 3 | 2.6798 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| Lag 2 | 2.9678 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |
| Lag 1 | 5.0909 | 3.93 | 5.23 | 3.12 | 4.25 | 2.75 | 3.79 |

Source: Authors' Calculations and the critical values are taken from Pesaran *et al*. (2001)

Similarly, remittances positively impact the development of Pakistan's financial sector. Specifically, the remittances coefficient shows that a 1% increase in remittances contributes to a 0.34% increase in the long run. The theoretical literature on the financial sector's determinant suggests that remittance sent through formal channels promotes financial intermediation (Aggarwal *et al*., 2011). It is well recognized that in the case of Pakistan, remittances increased after 9/11 through a formal channel. Therefore, we may say that the worker's remittances have strengthened Pakistan's financial sector, and our findings are in line with Aggarwal *et al*. (2011).

Inflation negatively affects the private credit to GDP but statistically insignificant in a few cases. Theoretically, inflation erodes individuals' purchasing power by creating an environment of uncertainty and shakes producers and consumers (Boyd *et al*., 2001; Aggarwal *et al*., 2011). In our findings, inflation enters significantly negative in all five models and follows earlier empirical and theoretical studies (Aggarwal *et al*., 2011; Boyd *et al*., 2001). Furthermore, the size of the economy enters significantly positive in the regression. The finding is in line with Robinson (1952) theory that finance follows economic growth. Furthermore, our results follow the recent empirical studies like Aggarwal *et al*. (2011), and Baltagi *et al*. (2009).

Then we add investment in regression 2 and the variables of base regression like trade, remittances, per capita GDP, and inflation. It is essential to mention here that investment inclusion does not alter another variable's signs, but only their magnitude changes. Furthermore, investment follows the literature (Huang, 2005; Levine, 1997). The estimated coefficients show that a 1% increase in investment stimulates credit to private by 0.12%. It implies that financial intermediation increases due to an increase in private investment because it pokes external finance.

**Table 4: Long Run estimates, Error Correction Term and Diagnostics**

| Regressors | *The dependent* variable is the natural log of *private* | | | | | *The dependent variable is the Financial Development Index* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Regression 1 | Regression 2 | Regression 3 | Regression 4 | Regression 5 | Regression 1a | Regression 2a | Regression 3a | Regression 4a | Regression 5a |
| *Trade* | 0.2108*** | 0.1463*** | 0.0990*** | 0.1066** | 0.1238** | 0.4644*** | 0.1837*** | 0.4317** | 0.3380*** | 0.1555* |
| | (0.0481) | (0.0554) | (0.0293) | (0.0497) | (0.0553) | (0.1853) | (0.0554) | (0.1924) | (0.1254) | (0.0858) |
| *Remittances* | 0.3392*** | 0.0454** | 0.0426 | 0.2170*** | 0.1353** | 0.1426*** | 0.1570* | 0.2534*** | 0.1725** | 0.1798*** |
| | (0.1031) | (0.0204) | (0.1332) | (0.0862) | (0.0692) | (0.0345) | (0.0873) | (0.0745) | (0.0798) | (0.0330) |
| *inflation* | -0.8979 | -0.7743* | -0.2284 | -0.2089*** | -0.3208 | -1.1273 | -0.9722* | -0.2868 | -0.2623*** | -0.4028 |
| | (0.6250) | (0.4052) | (0.488) | (0.0700) | (0.1996) | (0.9567) | (0.6160) | (0.1926) | (0.0955) | (0.3958) |
| *GDP* | 0.8288*** | 0.1134** | 0.2504** | 0.1083*** | 0.0637*** | 0.0406 | 0.1423* | 0.3143*** | 0.1359*** | 0.0800** |
| | (0.2400) | (0.0503) | (0.1229) | (0.0445) | (0.0256) | (0.0304) | (0.0778) | (0.0883) | (0.0444) | (0.0377) |
| *investment* | -- | 0.1202*** | -- | -- | -- | -- | 0.3509** | -- | -- | -- |
| | -- | (0.0372) | -- | -- | -- | -- | (0.1704) | -- | -- | -- |
| *public debt* | -- | -- | -0.0716* | -- | -- | -- | -- | -0.3899** | -- | -- |
| | -- | -- | (0.0372) | -- | -- | -- | -- | (0.1681) | -- | -- |
| *cal* | -- | -- | -- | 0.0755*** | -- | -- | -- | -- | 0.1948 | -- |
| | -- | -- | -- | (0.0234) | -- | -- | -- | -- | (0.1857) | -- |
| *mp* | -- | -- | -- | -- | -0.0785*** | -- | -- | -- | -- | 0.9862 |
| | -- | -- | -- | -- | (0.0142) | -- | -- | -- | -- | (0.7426) |
| *Intercept* | 0.2906* | 0.1346** | 0.2547*** | 0.0303*** | 0.4551 | 1.3648** | 0.7690*** | 1.3197*** | 0.9380** | 0.8714* |
| | (0.1489) | (0.0669) | (0.1065) | (0.0123) | (0.2947) | (0.6461 | (0.2181) | (0.3705) | (0.4484) | (0.4495) |
| $ECM_{t-1}$ | -0.2513*** | -0.2718*** | -0.1282* | -0.1751*** | -0.3113** | -0.1924* | -0.2623** | -0.0981*** | -0.3071** | -0.2383* |
| | (0.1001) | (0.0595) | (0.0675) | (0.0602) | (0.1556) | (0.1001) | (0.1321) | (0.0400) | (0.1529) | (0.1056) |
| Diagnostics (p-values) | | | | | | | | | | |
| $\chi^2$ *(Serial Correlation)* | 0.5028 | 0.3409 | 0.2311 | 0.1567 | 0.1062 | 0.3130 | 0.2802 | 0.3020 | 0.1968 | 0.3340 |
| $\chi^2$ *(Functional Form)* | 0.2010 | 0.1362 | 0.1192 | 0.1626 | 0.1425 | 0.5230 | 0.1711 | 0.3715 | 0.4187 | 0.7887 |
| $\chi^2$ *(Normality)* | 0.5234 | 0.3549 | 0.2406 | 0.1631 | 0.1106 | 0.7155 | 0.4455 | 0.2079 | 0.4809 | 0.1389 |
| $\chi^2$ *(Heteroscedasticity)* | 0.3148 | 0.2134 | 0.1447 | 0.1981 | 0.1665 | 0.9527 | 0.6799 | 0.8170 | 0.2319 | 0.8352 |

Note: the parentheses carry the standard errors and ***, **, * indicates significance at 1%, 5% and * 10%, respectively.

In regression 3, the measure of investment is replaced by public debt. The literature on FSD argues that public debt negatively impacts the financial sector, especially the banking sector (Ismihan & Ozkan, 2012; Hauner, 2009). Though the banks that hold public debt are profitable, they are less efficient. They decrease financial deepening. In our case, the credit to the private sector decreases by 0.7% due to a 1% increase in public debt. It implies the crowding-out effect and follows standard literature.

Regression 4 consists of capital account liberalization (*cal*) that is the sum of foreign direct investment and foreign portfolio investment over GDP and base model variables. Both are sources of external finance and promoting financial deepening. Capital account liberalization enters positively in the financial development regression. Specifically, a 1 percent increase in capital account liberation promotes the financial sector by 0.07 percent and in line with Law and Habibullah (2009), and Chin and Ito (2006). In the last model monetary policy, the lending rate is taken as the base model's control variable. The lending rate promotes the financial sector that is a credit to the private sector by 0.07 percent.

Short-run estimates state that the lending rate, capital account liberalization, public debt, and investment determine Pakistan's financial sector in the short run.[7] Generally, the error correction term is a vital outcome of the short-run analysis in the context of cointegration. This term reflects the adjustment speed from disequilibrium to equilibrium after an exogenous shock. The estimated models show a considerable variation in the speed of adjustment. Specifically, this term varies from 0.128 to 0.311 percent. However, the term is correct in the sign, which implies that the short-run disequilibrium will be adjusted in the long run. More specifically, 0.128 implies 12.8 percent of the disequilibria of the previous year's shock will be adjusted back to the long-run equilibrium in the current year in Pakistan's financial sector.

As mentioned earlier, we shall replace the credit to the private sector with an index (*fd*) calculated based on principal component analysis (PCA). The main objective of this is to get the robustness of our estimated model. Aziz and Duenwald (2002) point out that the financial sector estimates are sensitive to the financial sector measures. Furthermore, two different indicators may pose a different picture, as mentioned earlier. Therefore, this exercise will serve as a sensitivity analysis as well. It is evident from table 4, from regression 1a to regression 5a; the results do not alter despite the change of the financial sector's measure on the dependent side.

The regressions pass through some important diagnostic tests. The p-values are more extensive than 10 percent in all cases. This implies that the null hypothesis of no autocorrelation, no heteroskedasticity, errors are normally distributed, and correct functional forms are accepted. Furthermore, we use the cumulative sum (CUSUM) and cumulative sum of the square statistic (CUSUMSQ) given by Brown *et al*. (1995) to test the stability of estimates given by the ARDL estimator. We find that CUSUM and CUSUMSQ statistics are well within the critical bounds imply that the estimates are stable.[8]

## 7. CONCLUSION

This article explores Pakistan's financial sector's determinants by using measures like liquid liabilities and credit to the private sector as representative indicators of FSD. Furthermore, the financial development index is constructed by principal component analysis and is utilized as an alternative candidate. We use several unit root tests with and without structural breaks to get the true picture of the data series data generating process. These tests suggest that some of the variables are I(0), and some are I(1). Therefore, we use ARDL to establish a long-run relationship among the variables and estimate the error correction model.

[7] However, we are not presenting the table of short run keeping brevity in view.
[8] The graphs are not presented for brevity purposes. These are available on the request.

Our estimates are in line with the theoretical and empirical literature. Trade openness, capital account liberalization, per capita GDP, investment, and worker's remittances positively impact the financial sector development of Pakistan. On the other hand, inflation and public debt negatively affect financial sector development regression. Therefore, the article suggests that policymakers should focus on trade liberalization, capital account liberalization, and remittances to developing the country's financial sector. Similarly, inflation plays a negative role in the financial sector; therefore, it must be addressed. Since public debt is hurting the financial sector development, an independent and competitive banking system should be encouraged.

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