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FinTech Based Financial Inclusion and its Impact on the Performance of Banking Sector: Empirical Evidence from Pakistan

Urooj Fatima¹, Sayyid Salman Rizavi², Shaista Jabeen³ & Muhammad Farhan⁴

¹Research scholar; Hailey College of Commerce, University of the Punjab, Lahore, Pakistan

²Professor; Hailey College of Commerce, University of the Punjab, Lahore, Pakistan

³Assistant Professor; Lahore College for Women University, Lahore, Pakistan

⁴Assistant Professor, National University of Modern Languages, Islamabad

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Corresponding Author:

Shaista Jabeen

Email:

shaista.jabeen@lcwu.edu.pk

ABSTRACT

The purpose of this study is to provide an index for FinTech Development in Pakistan and to measure its effect on Pakistan's banking sector. Fin Tech is considered as a vital tool for financial inclusion but Pakistan has no robust means for measuring Fin Tech leading to lack of research in this field despite digital means being adopted widespread across the world. The data was gathered for a period of 10 years ranging from 2012 to 2021 and two-step Principal Component Analysis was used to develop the Fin Tech index. CAMEL analysis and a two-step dynamic GMM technique was used to measure the variables under study. Results indicate that FinTech experienced an initial boom in the early years of 2012 and witnessed a large resurgence in recent years possibly due to the Covid-19 pandemic. The impact of FinTech development on the banking sector is mostly positive with reference to asset quality, management efficiency, liquidity as well as earning power of banks. This study provides means for future research in this field as it is becoming quite apparent that the future is digital and in order to adapt, we must know how exactly various areas of our economy are impacted by this digitalization.



Introduction

Due to the rising inflation and uncertainty in past few years, all countries are struggling to ensure the stability and health of their economies especially for the long run. In the past, we have seen massive economic downturns caused by the collapse of the financial system. This collapse was due to the failure of governments and corporations to respond in a timely manner to the associated risks of economic downturns (Campanella, Della Peruta, & Del Giudice, 2017). The most well-known global crises arising from economic instability such as The Great Depression and the 2008 Financial crises have shown the importance of maintaining a working financial system that can not

only withstand such shocks but also resolve them in self-corrective measures (Demirguc-Kunt, Pedraza, & Ruiz-Ortega, 2020). The ideal financial system would absorb the impact of unexpected events while preventing them from having a severe and damaging impact on the entire economy (Hall, 2021). Since such major shocks impact not only the most established organization but also the very grassroot level of society.

Given the increased globalization and interconnectivity of today's world, when one economy fails, shock waves also travel to other parts of the globe much faster than most economies can react. Failures of the financial system have led to severe depression in the business cycles affecting the largest corporations and the most underserved population. If these shock waves stay recurring, then it can lead to investors, and many other stakeholders to lose confidence in the system. The reason economy can keep functioning is via savings and investing. But with low confidence people would rather not give their money in the hand of the financial system. Regulations and transparency provide enough confidence to boost the economy and keep money flowing in the system which aids in raising capital. Banks feed the economy by raising capital which drives the financial system (Norges Bank, 2019). Fair allocation of funds enables economic activity and prevents the stagnation of the economy. Banks and financial institutions are the building blocks of the financial system that also maintain and develop the financial structure further with constant innovation. Through risk management, investment appraisals, diversification, and financial frameworks that stand the test of time, banks invoke confidence in their consumers and stakeholders alike.

As the world is becoming more fast-paced, traditional banking practices seem to become more cumbersome, expensive and time-consuming. The banking sector, being the backbone of the economy is in dire need of upgradation. The need of the time is a modern infrastructure that is cost effective and time-efficient while also being reliable. Although this concept seemed far-fetched in the past, technological developments and automation techniques have made this very possible. With the advent of the internet and especially online banking, many routes to digitalization have been opened. J.D. Power (2021) found that 41% of customers in the banking industry prefer to perform their daily transactions through purely digital banking channels (Phuc Tran, 2022). These digital financial channels, known more commonly in the research field as financial technology ("FinTech") refers to the use of a digital platform that enables access to simple financial products and services in a seamless, sustainable manner well (OECD, 2020). FinTech is the fusion of two terminologies, Finance and Technology (Ahmed, Kumar, Talha, Akram, & Arif, 2024).

All major and growing industries are looking to integrate new technologies in their business models. Their positive aspects have been quoted over and over again in various papers, many have also pointed out the dangers that a flawed system can cause. However, digital solutions are not so simple to incorporate, as a major portion of the consumer population still lacks basic financial literacy and has limited access to financial services. This disconnect causes people to reject or revert change. Another hindrance is the lack of digital literacy amongst the underserved population as well as lack of access to digital resources (World Economic Forum, 2022). Third world countries have a chance to develop their economies by including a significant population in the formal financial sector. In order to ensure that the benefits of the coming technological revolution are reaped, every economy is looking towards implementing digital methods that are readily available and easy to access by even the commonfolk (Boot, Hoffmann, Laeven, & Ratnovski, 2021).

Considering the importance of digital growth in all aspects of our lives, we need various tools and methods to keep an eye out for the impact that such a revolution can cause. In order to facilitate further research on this concept, the World Bank provided three dimensions to measure FinTech based Financial Inclusion, (i) access (ii) usage and (iii) quality (GPFI, 2022). Although a simple

scale, there is much effort required to develop these aspects into a measurable concept. An index based in China developed by the Peking University was a large-scale project that used these dimensions to develop a comprehensive index showcasing FinTech Development in China over the past several years. This study was a major breakthrough in the field of FinTech research as it enabled many future research in this field showing how the adoption of these digital means impacts various sectors of the economy at various scales (Institute of Digital Finance, Peking University, 2019). Many aspects were observed, debating some negative impacts but mostly positive outlooks and opportunities arising from adoption of digital means. China being a developed economy recognized the need for digitalization as well as its measurement. However, many developing economies face hindrances due to the lack of information available in these aspects.

Pakistan has had difficulty promoting financial inclusion; however, it possesses the ability to utilize digital ecosystem to bring wealth management to currently underserved areas. The rise in smartphone ownership in Pakistan offers a chance to improve financial inclusion through online channels (GSMA, 2021). According to the National Financial Inclusion Strategy that SBP released in 2019, the market for digital financial services in Pakistan may grow to \$36 billion by 2025, boosting the country's GDP by 7% and adding four million people to the labor force (State Bank of Pakistan, 2019). The rising use of mobile phones, internet, and Artificial Intelligence models offer the chance to improve digital literacy as well as financial literacy amongst the youth and older population alike. When branchless banking licensing was introduced in 2008 by the State Bank of Pakistan in Pakistan, it offered FinTech firms, the boost they required to rapidly implement branchless banking and establish agent networks across the country. EasyPaisa and JazzCash are regarded as the pioneers of branchless banking in Pakistan and currently serve over 70% of all branchless banking customers in Pakistan. Due to the accessibility and simplicity of these platforms, they quickly expanded to hold a substantial market in the world of digital finance (Karandaaz, 2021).

Pakistan's current financial inclusion ratio stands at about 21 percent while the average for middle-income countries is 33 percent (World Bank, 2022). There are still many struggles for implementing and promoting FinTech in the country. Some due to people's resistance to change, while others due to lack of user friendliness. Whatever the case, there is no denying that the rise in digital aspects in our lives is not merely a phase, rather it is shaping to be the future. As mentioned, major positive aspects as well as some very sensitive negative aspects relating to digitalization have been quoted in many researches. Data privacy being the main struggle since the lower the financial and digital literacy, the less people are likely to understand how to protect their information. This is where banks are implementing more advanced security systems and actively providing the message to their consumers for safeguarding their own data. But despite the rise in internet connectivity and online transactions, there is a lack of research on how implementation of FinTech affects the economy. This lack of research can be attributed to there being no formal consensus on how to measure FinTech as well as there being no comprehensive index to estimate the level of FinTech Development in the country (Nguyen, 2021).

The objectives of this study are threefold i.e. to develop a suitable and reliable measure for FinTech and Financial Inclusion; to prepare an index showcasing the current state of Financial Inclusivity derived from FinTech in Pakistan; and to examine the effect of Financial Inclusion based on FinTech on the financial and non-financial performance of banking sector in Pakistan. Therefore, this study aims to bridge this gap in literature by establishing a FinTech Development Index based on Pakistan's Economy. Since the banking sector is the backbone of the economy providing capital and moving funds around as well as being the main source of increasing financial

inclusion in the country, this study also aims to measure what impact this technology has on Pakistan's banking environment.

The findings of the research will provide a number of contributions to academic scholars, bank management, and legislators. Pakistan is a developing nation where achieving financial inclusion is still extremely challenging. Pakistan requires a reliable system to track the development of this technology, and this study will be helpful for future research because it will serve as a starting point for further deeper studies. In addition, the banking system plays a significant role in capital accumulation, therefore understanding how fintech impacts this industry can help with policy creation. It is therefore crucial to understand how to quantify this idea. As more and more institutions and individuals are shifting towards digital measures, it is important to know how adoption of these methods impacts various sectors of our economy.

Literature Review

The United Nations unveiled a strategy in 2015 entitled "Transforming the World: The 2030 Agenda for Sustainable Development" that aims to propel the globe towards a more prosperous and thriving society. All developed and developing economies have been encouraged to work towards the 17 call-for-action goals presented in this agenda for promoting financial stability and integration for everyone (United Nations, 2015). Financial inclusion is widely acknowledged as a key tenet for achieving economic growth. Studies have shown that financial inclusion and SDGs can promote each other, and in the same way, FinTech and SDGs can mutually reinforce each other (Choudhary, Ghosh, & Thenmozhi, 2025). However, the financial inclusion ratio for developing countries stays as low as 33 percent (World Bank, 2022). As the achievement of many of the sustainable development goals provided by the United Nations is possible via financial inclusion, this topic has been studied extensively in research. A study by Nguyen (2020) provided a method for measuring financial inclusion in the developing countries stating the importance of this concept and being able to quantify it meaningfully. Zulfikar, Chaudhary, & Aslam (2016) assessed the importance of financial inclusion for a developing economy like Pakistan and provide extensive literature on other economies which have propelled forward by including their population into the financial circle. Pauli (2019) set to showcase how microfinance institutions aid in achieving greater financial inclusion. Similarly, extensive research has been conducted on how financial inclusion can leverage an economy towards economic development especially in underdeveloped countries.

FinTech, also known as financial technology or digital finance has marked the start of the digitalization and technological evolution of how transactions are made and credit is moved at government, corporate and even an individual level. A reason for this sudden shift is that mobile phone ownership and accessibility to the internet are increasing rapidly even in less developed nations. This offers these economies an excellent opportunity to use FinTech approaches to integrate their underserved sector into the formal banking system (Campanella, Della Peruta, & Del Giudice, 2017). The future is shaping up to be digitally enabled and it must be ensured that no sector or economy is left behind. Various economies are expected to greatly benefit from implementing and adopting these digital means. By 2025, it is predicted that more than 71% of all payments in India would be made digitally (The Economic Times, 2021). By implementing digital solutions, Mexico is also on track to grow its GDP by 340 billion dollars (Amin, 2022; McKinsey & Company, 2019). The positive outlook towards FinTech is widespread and many wonder how the digital future is shaping to be and how it will impact our daily lives in the near future. Banks have a direct influence on the growth of the economy and the financial sector. Numerous studies have also been done on how FinTech may help strengthen the banking industry's resilience in times of crisis by assisting with the reliable and responsible delivery of their services. The impact of

FinTech on the risk-taking of Microfinance Institutions is examined in the 2022 research centered on Sub-Saharan African nations. Banna et al. (2022) discovered in this study that when it comes to risk reduction, FinTech draws higher value particularly in emerging nations. Another study examined the moderating influence of risk on FinTech development and the economy and demonstrated the beneficial effects of FinTech on financial stability. The study discovered that the influence of FinTech on an economy's financial stability might be diminished by increasing systemic risk (Saleem, 2021).

Numerous studies have also highlighted the possible risks associated with the development of technology, including concerns about security and data privacy issues as well as the potential for increased indebtedness among unbanked populations and the increased unemployment ratio due to automation of certain jobs (Boot, Hoffmann, Laeven, & Ratnovski, 2021). According to these studies, laws and regulations must strike a balance between innovation, consumer protection, and financial stability to ensure that the effects seen by FinTech are mostly positive and well received (Liu, Li, & Shouyang, 2022). Studies have also suggested creating the required ecosystems and infrastructure to enable FinTech adoption, including digital identification and payment systems, as well as enhancing financial literacy and education among underprivileged people (Poon & Liang, 2017).

Concerns arise on how FinTech will affect the performance of the banking industry. an issue is that FinTech companies might endanger the stability of the banking industry through participating in unsafe loaning procedures or by providing financially unregulated goods and services (Khalid & Nadeem, 2017). Another issue is that by acquiring market share and lowering prices, FinTech firms might threaten the profitability of conventional banks. Twenty Pakistani banks' financial results from 2015 to 2019 were examined in research by Shahid, Gul, & Saleem (2019). They discovered that over the time period, banks' average ROA and ROE had decreased while their NIM had grown. The survey also discovered that Islamic banks performed better than conventional banks.

In 2020, the GPFi proposed some dimensions on how to measure FinTech based financial inclusion in order to aid research on this topic. The first step to study this topic is being able to quantify and operationalize it (UNSGSA, 2022). A large-scale project conducted by the Peking University of China set to achieve this goal and succeeded in developing a comprehensive and robust Digital Finance Index that represented the development, adoption and impact of FinTech of the Chinese economy (Institute of Digital Finance, Peking University, 2019). The significance of this piece of research cannot be overlooked as a major chunk of the research in the field of FinTech is from China. As observed by an extensive review of literature, this Chinese index was used in almost every study to adopt the research in this field. Developing economies can also benefit from this if they are provided a starting point for conducting further research. This study hence aims to develop a similar index for Pakistan's economy and also measure the impact of FinTech Development on the largest and more vital sector of our economy i.e. banks. The method used in this study for quantifying this concept is the same as dimensions suggested by the World Bank as well as those used by Peking University, China. The three dimensions, namely access, usage and quality are measured individually and then incorporated into a comprehensive index.

Methodology

To construct our FinTech Development Index, we gathered data from IMF's Financial Access Survey from the years 2012 till 2021. Samples from 28 operational Pakistani banks were collected over the course of 10 years and a total of 1,700 observations were gathered. We operationalize the FinTech based financial inclusion into three dimensions. The first dimension "access" is defined by the number of consumers who can use the financial services. The second dimension "usage" is defined by how often and to what extent these services are used and the third dimension "quality"

measures how readily these services are available and how wide the network and coverage lies in support of these services. The dimensions we will use as well as how each dimension will be measured has been summarized in Table 3.1. We will use a Principal Component Analysis to construct an index using the following dimensions.

Table 3.1 Summary of data sources and variables for FinTech Development Index

Dimension/Variable	Description	Data Sources
(1) Access		
-Deposit Accounts (DP_acc)	Number of deposit accounts with commercial banks per 1,000 adults	FAS-IMF
-Mobile Money Accounts (MB_acc)	Number of registered mobile money accounts per 1,000 adults	FAS-IMF
(2) Usage		
-Borrowers	Number of borrowers from commercial banks	FAS-IMF
-MB_balance	Outstanding balances on active mobile money accounts (% of GDP)	FAS-IMF
-MB_trans	Number of mobile money transactions (during the year) per 1,000 adults	FAS-IMF
(3) Quality		
-Branches	Number of commercial bank branches per 100,000 adults	FAS-IMF
-ATM	Number of Automated Teller Machines (ATMs) per 100,000 adults	FAS-IMF
-Mobile Money Agents (MB_agents)	Number of registered mobile money agent outlets per 100,000 adults	FAS-IMF

We will employ a two-step Principal Component Analysis to summarize the data above into an objective and comprehensive index. The second aspect of the research is to find the impact of FinTech inclusion on the banking sector's performance. Rather than using a single performance statistic, we used the CAMEL analysis to study the various financial and non-financial aspects of banking sector and how each of them are impacted by FinTech. Table 3.2 shows how each aspect of the CAMEL indicator was measured. The relating data was gathered from State Bank of Pakistan's Financial Statement Analysis of Financial Sector. Moreover, in order to measure the effect of Fintech on the CAMEL indicators a two-step GMM model was utilized.

Table 3.2 Summary of performance measures and data sources for bank performance

Dimension/Variable	Description	Data Sources
<i>Performance</i>		
-Capital Adequacy	Current Assets / Current Liabilities	FSA-SBP
-Asset Quality	Non-performing Loans / Total Loans	FSA-SBP
-Management Efficiency	Cost to Income ratio (CTI)	FSA-SBP
-Earning Power	Return on Assets (ROA)	FSA-SBP
-Liquidity Ratio	Liquid Assets / Total Assets	FSA-SBP
<i>Control Variables</i>		
-GDP	World Development Index	IFS-WB
-CPI	World Development Index	IFS-WB
-Bank size	Scaled by Bank Assets	FSA-SBP

The model we develop for the first step of our principal component analysis for the dimensions of Access, Usage and Quality denoted by X_a , X_u and X_q respectively are:

$$X_a = \alpha_1 DP_acc + \alpha_2 MB_acc + ei \quad (i)$$

$$X_u = \gamma_1 borrowers + \gamma_2 MB_balance + \gamma_3 MB_trans + ei \quad (ii)$$

$$X_q = \beta_1 branches + \beta_2 ATM + \beta_3 MB_agents + ei \quad (iii)$$

In the second step of PCA, we assign weights to each dimension and add to the following model.

$$FDI_i = w_1 X_a + w_2 X_u + w_3 X_q + ei \quad (iv)$$

In order to study the impact of FinTech on the banking sector, we develop the following autoregressive model; where FDI represents our newly developed FinTech index, γ represents bank level control variables and z represents macro level control variables.

$$CAMEL_{i,t+1} = \gamma_1 CAMEL_{i,t} + \alpha FDI_t + \beta \gamma_t + \theta z_{it} + ei \quad (v)$$

Findings

Table 4.1 Descriptive Statistics of FDI indicators

Variable	N	Mean	SD	Minimum	Maximum
Access (X_a)					
DB_acc	10	377.422	59.001	291.722	472.674
MB_acc	10	228.252	182.183	17.885	535.346
Usage (X_u)					
Branches	10	13045.80	1719.763	10295	15244
ATMs	10	9,029	2.111	5.286	11.141
MB_trans	10	3341446.63	2735616.299	492282.1	8971352
Quality (X_q)					
Borrowers	10	116433.22	43533.672	61594	177518
MB_balance	10	21793.173	21827.110	1055	65580
MB_agents	10	131.522	7446.778	27.70	185.429

While using PCA to estimate our dimensions, the values for each variable were normalized to ensure interpretability and stability of the scale; with 0 showing no Financial Inclusion and 1 representing Financial Inclusion via FinTech platforms.

In order to develop our index, eigenvalues above 1 were considered for each dimension. The generated eigenvalues for each dimension, i.e., access usage and quality were 1.938, 2.614 and 2.596 respectively. Only the first principal component of each dimension had an eigenvalue greater than 1 and represented 99.15 percent, 87.15 percent and 86.55 percent of the variance in the data for access, usage and quality respectively. For the first dimension of access, the analysis yielded

factor loadings of 0.707 for both the variables **DB_acc** and **MB_acc**. Consequently, Equation 1, after substituting the values for α and e , is expressed as follows:

$$Xa = 0.707 (DP_acc) + 0.707 (MB_acc) + 0.017 \quad (vi)$$

To assess the appropriateness of each component, the KMO test was used. A KMO rating above 0.5 is regarded as acceptable in literature hence $KMO > 0.5$ was the guideline used in our analysis. For the second dimension, borrowers, MB_trans, and MB_balance produced loadings of -0.5231, 0.6035, and 0.6017 respectively, 0.658 value of KMO with a significance of 0.00 was generated fulfilling our benchmark. Eq.2 now becomes:

$$Xq = -0.5231 (borrowers) + 0.6017 (MB_balance) + 0.6035 (MB_trans) + 0.1329 \quad (vii)$$

The first principal component (PC1) for the quality dimension produced factor loadings of 0.5949 for branches, 0.6052 for ATMs, and 0.5288 for MB_agents, respectively. Henceforth, the eq.3 after inserting values for β and e become as follows:

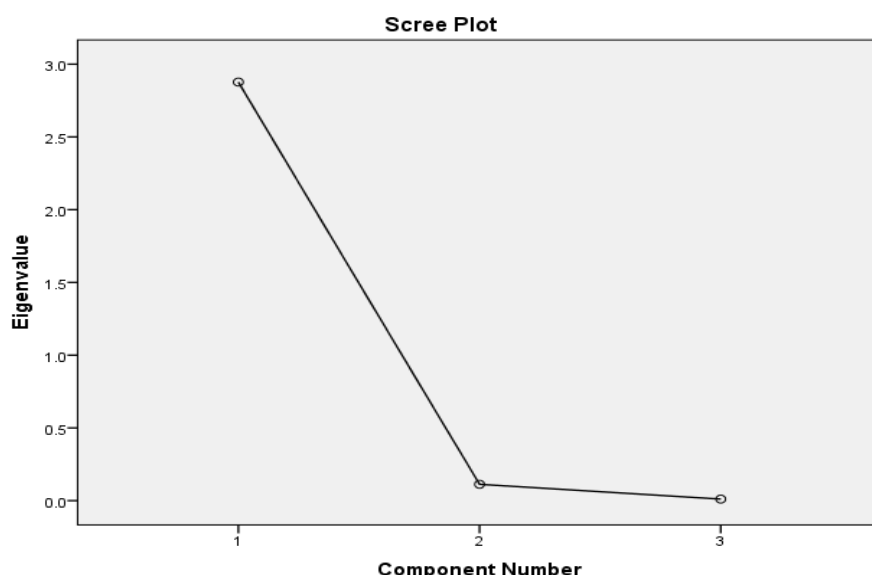
$$Xq = 0.5949 (branches) + 0.6052 (ATM) + 0.5288 (MB_agents) + 0.1253 \quad (viii)$$

The third dimension generated a KMO value of 0.591 with a significance of 0.000.

Moving onto our FinTech Development Index using the three components we estimated during the first step, we use the factor loadings to assign weights and calculate eigenvalues in stage two of our principal component analysis. The highest produced eigenvalue for this step was 2.8769, which accounted for 95.90 of the total variances so we use factor loadings corresponding to this component. Additionally, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy gives a value of 0.587 with a significance level of 0.00, highlighting to the appropriateness of our recently created index. Figure 4.1 displays the scree plot for the eigenvalues of FDI. The loadings are 0.5714, 0.5874, and 0.5730 for access, usage, and quality, respectively. Hence the eq.4 becomes:

$$FDI = 0.5714 (Xa) + 0.5874 (Xu) + 0.5730 (Xq) + 0.0107 \quad (ix)$$

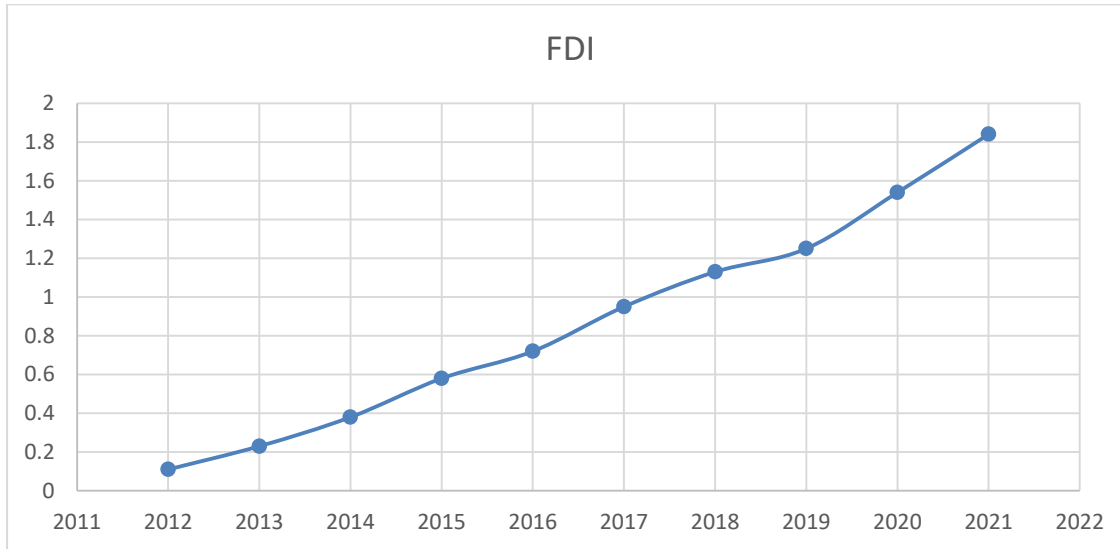
Figure 4.1: Scree Plot of eigenvalues for FDI



As in earlier studies, FDI values below 0.5 suggest financial exclusion, whereas those over 0.5 serve as an indicator for financial inclusion. The Index established and depicted in Figure 4.2 highlights the shift in the level of FinTech-based Financial Inclusion. The steady rise over the years

as well as the exceptional boom around 2019 Covid-19 era can be observed. This puts into perspective how the recent pandemic rapidly shifted the population towards online method for transacting, communicating and borrowing.

Figure 4.2: Change in FDI over the years



The other half of this research comprises assessing the effect of our recently designed FDI on the performance of Pakistani banking system. We have also assessed whether the CAMEL indicators of one year have any significant impact on the indicators for the succeeding year. Table 4.2 exhibits control variables, FinTech index, and descriptive data of our 5 CAMEL indicators.

Table 4.2 Descriptive Statistics of Banks Performance

Variable	N	Mean	SD	Minimum	Maximum
Panel A: Bank Performance					
Capital adequacy	280	-0.142	1.186	-7.21	0.52
Asset quality	280	0.16	0.21	0.00	0.99
Management efficiency	280	2.16	1.219	1.74	9.13
Earning power	280	0.0068	0.0207	-0.11	0.18
Liquidity ratio	280	0.08	0.03	0.007	0.25
Panel B: FinTech Development Index					
FDI	10	0.874	0.5722	0.11	1.84
Panel C: Control variables					
GDP growth rate	10	4.0600	2.18439	-1.30	6.20
CPI	10	6.9900	2.92174	2.50	10.60
Bank Size (M)	280	613.5	74.0	3.8	407.5

Table 4.3 shows the estimated results of the two-step dynamic GMM technique. Column 1 to 5 show the five CAMEL indicators.

Table 4.3 Performance measure under the CAMEL rating system

	Capital Adequacy	Assets Quality	Management Efficiency	Earning Power	Liquidity Ratio
CAMEL _(t-1)	1.01 (0.07) <0.001***	0.98 (0.34) 0.004**	0.91 (0.02) <0.001***	1.14 (2.50) 0.646	0.01 (1.36) 0.991
FDI	-2.32 (2.27) 0.991	10.81 (3.39) <0.001***	6.65(2.36) 0.005**	8.86 (1.68) <0.001***	17.4 (1.23) <0.001***
Assets	-2.5 (8.2) 0.759	-7.8 (4.00) 0.051	-9.9 (3.5) 0.004**	5.41 (2.99) 0.071	5.48 (1.58) <0.001***
GDP	4.45 (0.48) <0.001***	0.61 (1.21) 0.316	-0.01 (0.10) 0.875	11.48 (9.07) 0.206	-6.43 (4.80) 0.181
CPI	-5.74 (2.94) 0.052	2.72 (4.40) <0.001***	-3.72 (3.07) <0.001***	3.53 (2.19) 0.107	-1.55 (1.58) <0.001***

Above is estimated parameters of model, the value of coefficients, the standard error is in parenthesis, asterisk ***, as statistically significant at <1%, asterisk ** as significant at 1% and one * statistically significant at 5%.

Discussion

The index created using the above method demonstrates that a significant level of financial inclusion is attained as a result of mobile money alternates. Over the years, FinTech development as a whole has been steadily increased. Consumers are continually turning to digital means as a cheaper and more convenient method, and the banking industry has been incorporating more and more FinTech solutions as customer demand shifts. As the world becomes increasingly digitalized, it is essential to have a method to measure this digitalization.

According to our findings, the year 2013 had the most significant increase in FinTech-based financial inclusion. This finding is supported by earlier research that indicated the development of financial technologies in 2012 was an essential footstep in transforming the digital industry. 109% increase in FDI from 2012 to 2013 is its proof. Since then, FinTech platforms have improved financial inclusion, but not to the same extent as during the original boom in 2012–2013. Our data also demonstrates that, following its initial boom, the pace of growth in FinTech-based financial inclusion has been steadily falling, albeit still being positive. In 2019 its growth was 10%, however, in 2020 it began to increase again at a much faster pace. This increase is most likely described by the Covid-19 pandemic where digital and contactless methods started becoming the standard. Consumers and businesses both started rapidly adapting digital means for their routine matters, the impact of which can also be seen in our FDI.

Our GMM analysis shows how each indicator of CAMEL is impacted by FinTech Development. It is clear from a positive and substantial association that FDI may enhance asset quality as well as liquidity, management, and earnings. FinTech development and implementation may help increase the banking industry's overall quality, productivity, and profitability. According to the auto-regressive model, the earnings and liquidity ratios of the present year neither predict nor have an influence on those of the following year. Capital risk, asset risk, and management efficiency, however, all are positive and highly significant, indicating a potential impact on the outcomes for the next year. The impact of FDI on capital adequacy is negligible, demonstrating that FinTech development has little effect on banks' ability to absorb losses and take on risk. The asset quality ratio's positive and large value demonstrates how FDI may lower the likelihood of a bank defaulting and raise the degree of risk in its investment portfolio. According to the Management

Efficiency ratio, FDI can increase overall inventory, asset, and receivable efficiency to enable more effective use of these resources. Earnings Ratio suggests that FDI may be utilized to more efficiently distribute available resources, making them more lucrative. Last but not least, the liquidity ratio demonstrates how well a bank's assets can pay its obligations when necessary.

Additionally, our results are contrasted with those of earlier research on this relationship. One such research by Rehman, Hassan, Imran, & Khan (2022) set to evaluate the effect of FinTech on the performance of commercial banks in Pakistan. FinTech adoption has a favorable effect on operational efficiency of banks, according to the research. Another study by Khan, Polat, & Bashir (2023) employed the CAMEL analysis to assess how FinTech has affected Pakistani conventional and Islamic banks' financial performance using data from 2013 to 2017. FinTech adoption has a beneficial effect on bank performance, particularly in terms of capital adequacy, asset quality, and liquidity indicators, according to the study. However, managerial effectiveness and profitability indicators showed no discernible influence. In contrast, research by Hasan, Hassan, & Aliyu (2020) used the CAMEL analysis to assess the effect of financial technologies on the financial performance of Pakistani Islamic Banking Institutions. Adoption of FinTech had a detrimental effect on Islamic banks' performance, particularly in relation to liquidity metrics and asset quality, according to the study, which utilized data from 2010 to 2016.

Limitations & Future Research

Some of the limitations faced by this study were due to time constraints. This study can be conducted on a much larger scale with many other variables being included in the index. Various variables relating to digital finance were excluded as they did not meet the statistical benchmarks set by the study. Also, the data we had on this topic was limited. This limitation can be removed by gathering primary data however this requires a study of a larger scale, one which was not possible for the current time and resources of the author. Only the implications of FinTech development on the banking industry have been investigated in this study. Further research can examine how FinTech affects several other economic sectors, both financial and non-financial. Additionally, the research solely used CAMEL analysis to evaluate banks' overall performance. Future studies might also look at the credit policies and risk-taking practices of the banking industry and other industries

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