Non-linear Impacts of Financial Inclusion on Pakistan's Inclusive Growth: A Regime-Switching Approach

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Abstract: *This study explores the connection between financial inclusion and inclusive growth, highlighting the pressing need for such growth in contemporary Pakistan alongside the ongoing efforts to enhance financial inclusion levels. Utilizing a time series dataset from 2004 to 2022, we investigate variables including the index of inclusive growth, the composite index of financial inclusion, FDI, budget deficit, remittances, and government effectiveness. The analysis employs the Markov regime-switching technique to address the non-linearity of the data. Findings indicate a non-linear relationship between inclusive growth and financial inclusion. Financial inclusion has a significant and positive effect on inclusive growth during low-growth periods but exhibits negative effects during high-growth periods. Government effectiveness consistently demonstrates a positive impact across both high and low-growth phases, with a more pronounced effect during low-growth periods. Remittances negatively influence growth, while FDI and budget deficit show significant positive effects during low-growth periods. Key recommendations include enhancing rural financial access and digital literacy during low-growth phases, addressing structural and regulatory inefficiencies during high-growth periods, and integrating Islamic finance into national strategies. Strengthening governance and periodically reviewing policies to align with evolving economic conditions are also vital for achieving sustained and equitable development.*

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1. Introduction

Financial inclusion catalyzes inclusive growth, empowering marginalized and underserved populations with the necessary tools and resources to actively engage in economic activities (Demirgüç-Kunt and Singer, 2006). Inclusive growth, in turn, is a comprehensive process that ensures the equitable distribution of social and economic gains, enhances well-being, improves capabilities, and promotes environmental sustainability (Saha et al., 2022). This interconnected nexus fosters a more equitable and resilient economy by bridging socio-economic disparities and encouraging sustainable development.

Inclusive growth embodies two core dimensions: equitable economic development and environmental sustainability, both of which are critical in addressing persistent challenges such as inequality, poverty, and environmental degradation. The National Human Development Report (NHDR, 2020) underscores the importance of bridging disparities among different segments of Pakistan's population, emphasizing social equity alongside environmental considerations. This study adopts the World Bank's definition of inclusive growth, which highlights the notion that economic progress should benefit all segments of society, regardless of their socio-economic standing while integrating green development principles (Dai & Shi, 2023).

Similarly, financial inclusion is defined as the provision of accessible and affordable financial services across the economic spectrum, enabling individuals to save, invest, and access credit and insurance (Demirgüç-Kunt & Klapper, 2012). Unlike broader concepts like financial development or financial education, financial inclusion specifically focuses on ensuring access to essential financial services, particularly for marginalized populations. This study consistently uses the term "financial inclusion" to avoid ambiguity.

The relationship between financial inclusion and inclusive growth has become increasingly central in development discourse. While early economists largely ignored financial inclusion as a growth driver, modern studies recognize its potential to promote equitable economic development and address socio-economic disparities (Ifediora et al., 2022; Kunt et al.,

2017). Globally, financial inclusion is a pivotal tool for achieving Sustainable Development Goals (SDGs), as it tackles poverty, reduces inequality, fosters green growth, and builds human capital (Da, 2018; Khan & Rehan, 2022). However, in Pakistan, the high level of financial exclusion necessitates stronger inclusive finance policies (Zulfiqar et al., 2016). Improving financial literacy and expanding digital financial services are crucial to achieving more effective outcomes and aligning with the UN's SDGs by 2030.

Recognizing these challenges, Pakistan has implemented several initiatives, such as the National Financial Literacy Program and gender-responsive financial inclusion policies like "Banking on Equality. " These efforts aim to expand access to financial services and address systemic gaps in financial inclusion. Additionally, programs such as the Rohan Digital Account for non-resident Pakistanis signify progress in leveraging digital finance to promote inclusivity.

Despite these advancements, critical questions persist regarding the interplay between financial inclusion and inclusive growth, particularly under different economic conditions. Previous studies have investigated the relationship between financial inclusion and poverty reduction, equality, and environmental sustainability. However, our understanding of the non-linear dynamics underlying these interactions remains limited, especially in the context of developing economies like Pakistan.

To address this gap, our study employs a Markov regime-switching approach to capture the non-linear relationship between financial inclusion and inclusive growth across different growth regimes. Unlike threshold or linear models, the regime-switching technique offers a more nuanced understanding by accounting for continuous shifts in Pakistan's economic, social, and political conditions. This analytical choice reflects the complexity of these relationships and the dynamic nature of the variables involved. Furthermore, this study constructs composite indexes for financial inclusion and inclusive growth, utilizing Principal Component Analysis (PCA) and Sarma's (2015) distance-based method. These indexes incorporate multiple dimensions such as the economy, living standards, inequality, and environment, providing a holistic framework for analyzing inclusive growth beyond traditional economic metrics.

In summary, this research aims to provide a context-specific analysis of the intricate relationship between financial inclusion and

inclusive growth in Pakistan. By addressing gaps in the literature and employing advanced econometric techniques, this study seeks to offer valuable insights for policymakers and stakeholders striving to foster equitable and sustainable economic development.

2. Literature Review

Financial inclusion, as described by McKinsey & Company, ensures access to essential financial services that enable individuals to save, build wealth, and invest. It plays a crucial role in addressing poverty and income inequality, facilitating long-term economic stability (Omar & Inaba, 2020). Studies indicate that financial inclusion is vital for achieving Sustainable Development Goals (SDGs) by promoting green growth, reducing inequality, and enhancing human capital (Tay et al., 2022; Khan & Rehan, 2022). For example, Tay et al. (2022) conducted a systematic review of 34 studies, highlighting the impact of digital financial inclusion on the achievement of SDGs. Furthermore, these studies emphasize how technological innovations have expanded financial access, closing gaps for underserved communities.

Inclusive growth, on the other hand, is a multidimensional concept that emphasizes the equitable distribution of economic gains across all segments of society. According to the Organization for Economic Cooperation and Development (OECD), inclusive growth aims to ensure that economic progress benefits everyone. This includes improving living conditions, reducing inequality, and addressing environmental sustainability (UNCTAD, 2023). While financial inclusion is instrumental in creating opportunities, inclusive growth ensures that these opportunities translate into equitable socio-economic outcomes (Park et al., 2015).

Developing economies, particularly in South Asia and sub-Saharan Africa, have exhibited varying levels of financial inclusion. Pakistan, despite its efforts, lags behind its regional counterparts regarding financial access and usage (Zulifqar et al., 2016). Factors such as low financial literacy, inadequate infrastructure, and socio-cultural barriers contribute to this disparity (Chibba, 2009). Financial exclusion not only restricts individual economic potential but also hinders aggregate economic growth by decreasing investments and increasing transaction costs (Omar & Inaba, 2020).

Internationally, financial inclusion has been linked to achieving Sustainable Development Goals (SDGs), particularly in areas like poverty reduction, gender equality, and economic growth (Khan & Rehan, 2022). The G20's Maya Declaration and initiatives such as the World Bank's Universal Financial Access program emphasize the global commitment to enhancing financial inclusion.

The relationship between financial inclusion and inclusive growth in Pakistan has been extensively researched. Studies indicate that financial inclusion positively influences economic growth by improving access to credit, promoting entrepreneurship, and facilitating resource allocation (Iqbal & Sami, 2017). However, financial inclusion in Pakistan remains limited, with only 21% of adults having access to formal financial services as of 2017. Gender disparities further aggravate the issue, as women are significantly underrepresented in the financial ecosystem (State Bank of Pakistan, 2021).

Pakistan's National Financial Inclusion Strategy (NFIS) aims to address these gaps by promoting digital finance, enhancing financial literacy, and expanding Islamic banking. Initiatives such as the "Banking on Equality" policy and the "Roshan Digital Account" target specific segments, including women and overseas Pakistanis, to improve inclusion. However, structural challenges like low digital literacy and inadequate regulatory frameworks hinder progress (Ministry of Finance, 2018).

The empirical relationship between financial inclusion and inclusive growth is nuanced. Studies using panel data and advanced econometric techniques have demonstrated that financial inclusion contributes to poverty alleviation, income equality, and improved living standards. Omar and Inaba (2020) found that financial inclusion significantly reduces poverty and income inequality by facilitating access to credit and promoting economic participation.

In Pakistan, Zulifqar et al. (2016) emphasized the potential of financial inclusion to foster sustainable economic growth. However, they observed that the country's financial infrastructure is not adequately equipped to support widespread inclusion. Factors such as low trust in financial institutions, gender biases, and inadequate policy implementation were identified as key barriers.

Omar and Inaba (2020) found a significant negative relationship between financial inclusion and poverty in developing countries.

Similarly, Koomson et al. (2020) demonstrated that financial inclusion reduces household poverty by 27% in Ghana, with greater benefits observed in rural areas. Additionally, the findings suggest that financial services targeting women and marginalized groups amplify the impacts of poverty reduction, particularly in underdeveloped regions. Studies like Ifediora et al. (2022) highlight that while the availability and penetration dimensions of financial inclusion positively impact economic growth in Sub-Saharan Africa, usage dimensions have limited effects. This finding aligns with Sarma (2015), who showed a positive nexus between financial inclusion and GDP growth in India. Furthermore, Iqbal and Sami (2017) revealed that the expansion of banking infrastructure significantly boosts GDP, suggesting that both physical and digital financial access remain critical for economic advancement. Dou and Li (2022) examined the impact of financial inclusion on carbon emissions in BRICS nations. They found that while financial inclusion promotes technological advancements, it also contributes to carbon emissions. Saleem et al. (2022) similarly noted a complex relationship between financial inclusion and green growth in SAARC economies. These studies indicate that while financial inclusion supports economic activities, its environmental implications require strategic management to align with sustainability goals.

Despite its potential, financial inclusion in Pakistan faces several challenges. A significant portion of the population lacks basic financial knowledge, which limits their ability to access and effectively utilize financial services (Zucchelli, 2023). Women face socio-cultural and institutional barriers that restrict their financial participation. Only 30% of women were part of the labor force in 2021, and their access to financial services remains constrained (State Bank of Pakistan, 2021). Inadequate physical and digital infrastructure hampers financial inclusion, particularly in rural areas where access to banking services is limited (Omar & Inaba, 2020). Inconsistent policies and regulatory challenges, including the absence of a unified digital payment system, impede progress.

Lessons from other developing countries can inform Pakistan's financial inclusion strategies. For instance, India's Pradhan Mantri Jan Dhan Yojana (PMJDY) successfully integrated millions into the formal financial system by utilizing digital technology and direct benefit transfers.

In sub-Saharan Africa, studies by Ifediora et al. (2022) and Huang et al. (2022) demonstrate that financial inclusion enhances human capital and reduces income inequality. These findings highlight the importance of
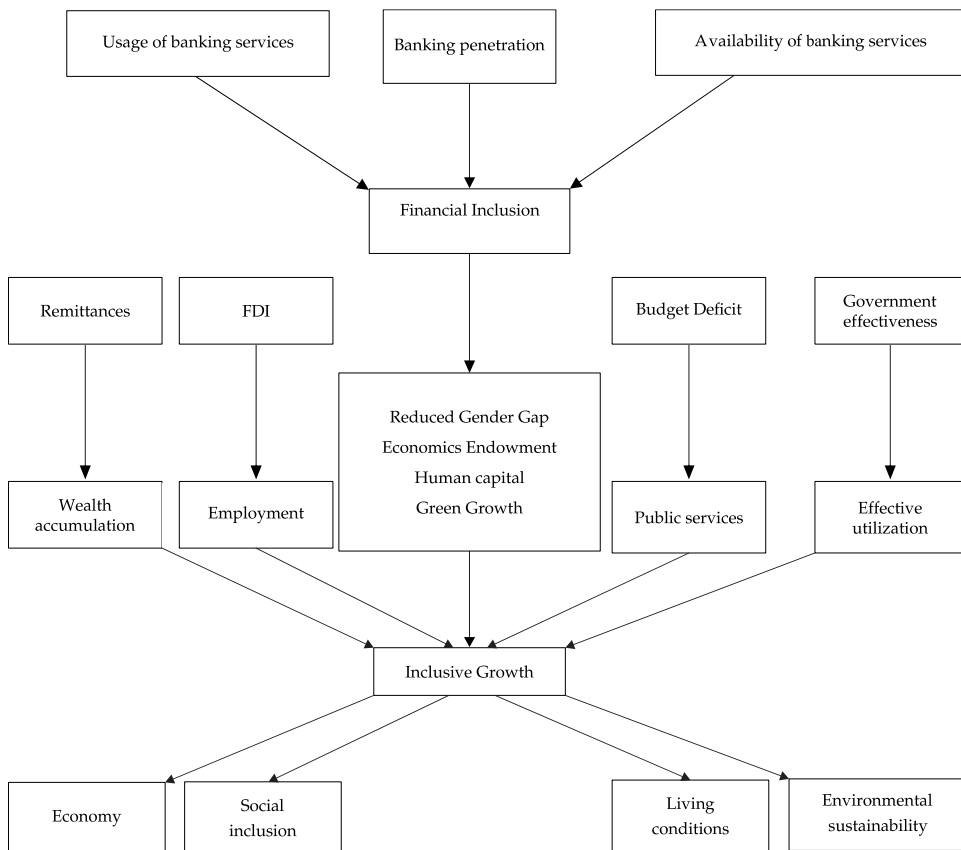
innovative solutions, including mobile banking and digital finance, in overcoming traditional barriers to financial inclusion.

Prior research demonstrates diverse methodological approaches to studying financial inclusion. For example, Li et al. (2022) utilized spatial Durbin models to analyze the regional spillover effects of digital financial inclusion in China, while Ofori et al. (2022) employed system GMM to assess the role of ICT in Sub-Saharan Africa. These studies highlight the importance of capturing spatial and temporal variations, which informed this paper's choice of the Markov regime-switching model. Unlike linear or threshold models, regime-switching techniques permit dynamic analyses of non-linear relationships under varying economic conditions. Furthermore, Sarma (2015) emphasized the role of composite indexes, which offer a multidimensional understanding of the impacts of financial inclusion. By integrating these methodological insights, this study provides a robust framework for analyzing Pakistan's unique dynamics.

Existing literature offers valuable insights into the relationship between financial inclusion and inclusive growth, yet significant gaps persist. For instance, many studies concentrate on single dimensions of financial inclusion or fail to consider regional and contextual differences. Furthermore, the non-linear dynamics of this relationship, particularly in developing economies like Pakistan, remain underexplored. While studies such as Ifediora et al. (2022) and Tay et al. (2022) provide foundational perspectives, they often overlook how socio-political factors, including governance and institutional quality, mediate these impacts. This study seeks to address these gaps by employing a composite index approach and a regime-switching model to offer a nuanced understanding of financial inclusion's impact on inclusive growth. Additionally, this research uniquely integrates governance variables, which are critical in shaping financial access and economic equity in Pakistan.

This literature review highlights the multifaceted role of financial inclusion in fostering inclusive growth across areas such as poverty reduction, economic growth, and environmental sustainability. By organizing findings thematically and connecting them to the study's objectives, this section lays a clear foundation for the subsequent methodological and empirical analyses. Moreover, by addressing gaps in existing research, this study contributes to a deeper understanding of financial inclusion's potential to drive equitable and sustainable development in Pakistan.

3. Conceptual Framework

| Usage of banking services | Banking penetration | Availability of banking services |

Financial Inclusion

| Remittances | FDI | | Budget Deficit | Government effectiveness |

Reduced Gender Gap
Economics Endowment
Human capital
Green Growth

| Wealth accumulation | Employment | | Public services | Effective utilization |

Inclusive Growth

| Economy | Social inclusion | | Living conditions | Environmental sustainability |

Source: Author.

4. Data and Methodology

For the analysis of a time series dataset spanning from 2004 to 2022, data availability was restricted due to the commencement of the financial access survey in 2004. In this study, the dependent variable was identified as inclusive growth, while the independent variables included financial inclusion, remittances, FDI (Foreign Direct Investment), budget deficit, and government effectiveness. A comprehensive description of each variable and their respective calculations is provided below. Furthermore, the model used in the analysis is presented below.

$$igi \ = \ f(cifi, govn, rem, fdi, deft) \tag{1}$$

Table 1: Variables Description

Variable	Label	Description	Source
IGI	Inclusive growth Index	Denotes economy, equality, living standard and environment.	Author's calculations
CFII	Composite financial inclusion index	Express access, usage and availability of financial services.	Author's calculations
REM	Remittances	Personal remittances, received (% of GDP)	World bank
FDI	Foreign direct investment	Foreign direct investment, net inflows (% of GDP)	World bank
DEFT	Budget deficit	Fiscal deficit (% of total expenditure)	Pakistan economic survey
GOVN	Government effectiveness	Represents governance	World bank

5. Index of inclusive growth

The literature suggests that GDP per capita, often used to represent inclusive growth, reflects only the average income of individuals and does not provide insights into their actual living conditions or whether they have genuinely benefited from it (Prasad & Castro, 2018). In response to this limitation, international institutions such as the Asian Development Bank, IMF, and UN have developed various indexes to capture different dimensions of inclusive growth, incorporating multiple indicators (McKinley, 2010; Anand, 2013; UNCTAD & EEC, 2019). While adopting the UN methodology to construct our inclusive growth index, the UN considers four dimensions, comprising a total of 27 indicators (UNCTAD, 2022). However, our index, constrained by data availability, is based on 22 indicators. Despite this limitation, each described aspect of every dimension is represented by at least one indicator, rendering it a comprehensive, if not detailed, index.

The construction of our index utilized the Principal Component Analysis (PCA) method, in accordance with the UN methodology. However, the PCA method requires complete data, and certain variables, such as account ownership, the logistic performance index, and the poverty headcount ratio, were missing complete data. To address this issue, the linear interpolation method was applied, remaining consistent with the UN methodology. The proportion of missing data in the analysis was relatively small, and interpolation was chosen as a widely accepted method for addressing such cases, particularly when data points exhibit a clear trend over time or within a defined range. This interpolation method

was employed to fill in the data gaps, ensuring a more complete representation of the multidimensional aspects of inclusive growth in our index. A complete overview of the dimensions, indicators, and their source data is provided in Table 2.

Table 2: Index of Inclusive Growth

Dimension	Indicators	Source
Economy	Electric power consumption (kWh per capita)	World bank
	Exports (% of GDP)	World bank
	Net national income per capita (current US$)	World bank
	Annual growth rate of output per worker (%)	UNSTATS
	Employment to population ratio, 15+, total (%)	World bank
	GDP per capita, PPP (constant 2011 international $)	World bank
Living standard	Account ownership at a financial institution or with a mobile-money-service provider (% of population ages 15+)	World bank
	Fixed broadband subscriptions (per 100 people)	World bank
	Logistics performance index	World bank
	School enrollment, secondary (% gross)	World bank
	Coverage of essential health services	UNSTATS
	Mortality rate, under-5 (per 1,000 live births)	World bank
	People using safely managed drinking water services (% of population)	World bank
Equality	School enrollment, secondary (gross), gender parity index (GPI)	World bank
	Proportion of seats held by women in national parliaments (%)	World bank
	Poverty headcount ratio at $6.85 a day (2017 PPP) (% of population)	World bank
	Wage and salaried workers, female (% of female employment)	World bank
	Ratio of female to male labor force participation rate (%)	World bank
	Gini index	World bank
Environment	Energy intensity level of primary energy (MJ/$2017 PPP GDP)	World bank
	CO2 emissions (kg per PPP $ of GDP)	World bank
	water productivity	World bank

6. Composite Index of Financial Inclusion

The Composite Financial Inclusion Index was determined using the methodology outlined by Sarma (2015). This methodology closely aligns with the approach adopted by the UNDP for constructing the Human Development Index. However, the Composite Financial Inclusion Index enhances this methodology by incorporating a distance-based approach. This method assesses the distance of the index from both the ideal and

worst points. The use of a distance-based technique is considered appropriate due to its adherence to crucial mathematical properties, including boundedness, unit-free measurement, homogeneity, and monotonicity (Omar and Inaba, 2020). Some adjustments in indicator selection were influenced by the work of Ifediora et al. (2022). The transformative role of mobile banking was also considered during the index's construction. Comprehensive details regarding the variables and dimensions can be found in Table 2. The first dimension index was calculated using the formula provided by Sarma (2015).

$$z_i = m_i \frac{X_i - l_i}{U_I - l_i} \tag{2}$$

Where

m_i = given weight of a dimension i, $0 \leq m_i \leq 1$

X_i = actual value of dimension i.

l_i= lowest value for dimension i, fixed by some pre-specified rule.

U_i = highest value for dimension i, fixed by some pre-specified rule.

For the minimum value of each dimension, 0 was used, while the highest value was determined by extracting the 90th percentile from available global data. The decision to assign equal weight to all dimensions (each receiving a weight of 1) was made to reflect their equal importance, As every variable in a dimension is similar and relative to the other one which gives them equal importance of 0.5. Also, a dimension or two without another one cannot perform effectively, in line with the approach used by Sarma (2015). Sarma's (2015) index was widely used in previous literature mostly in cases of third-world countries including Pakistan and is the most advanced method to measure financial inclusion. After computing individual dimension indices, the Composite Financial Inclusion Index was derived using the Principal Component Analysis (PCA) method. This methodological choice aims to provide a comprehensive assessment by capturing the multidimensional aspects of financial inclusion in the index. The following formula was applied.

$$CIFI = \frac{1}{2} \left[\frac{\sqrt{z_1^2 + z_2^2 + z_3^2}}{\sqrt{n}} + \left(1 - \frac{\sqrt{(1-z_1)^2 + (1-z_2)^2 + (1-z_3)^2}}{\sqrt{n}} \right) \right] \tag{3}$$

The index ranges from 0 to 1, where 0 signifies no financial inclusion and 1 indicates a high level of financial inclusion. Here, "z" refers to the dimension index of each category, as explained in equation 2, while "n" denotes the total number of dimensions, which is 3 in this case.

Table. 3: Composite Index of Financial Inclusion

Name of Dimension	Indicators	Weightage	Source
Penetration	Number of depositors with commercial banks per 1,000 adults	0.5	IMF
	Number of active mobile money accounts per 1,000 adults	0.5	IMF
Availability	Number of commercial bank branches per 100,000 adults	0.5	IMF
	Mobile money agent outlets: active per 100,000 adults	0.5	IMF
Usage	Domestic credit to private sector (% of GDP)	0.5	WDI
	Bank deposits to GDP (%)	0.5	WDI

7. Descriptive Statistics

To assess the performance of different political regimes in Pakistan, data was visually represented through figures. Figure 1 illustrates the mean values of inclusive growth, financial inclusion, and government effectiveness over time. From the depiction in Figure 1, it is evident that the level of inclusive growth has declined over time. The highest point was observed during the PML-Q (Pakistan Muslim League-Q) era, while the lowest occurred during the tenure of the PTI (Pakistan Tehreek-e-Insaf).

On the other hand, financial inclusion has shown an upward trend over the specified time period. The PPP (Pakistan People's Party) era is noted as the most effective regarding governance, followed in order by the PML-N (Pakistan Muslim League-N) and PTI eras. Notably, the PML-Q era demonstrated the least effectiveness in terms of governance. These trends offer insights into the differing performance levels of political regimes concerning inclusive growth, financial inclusion, and governance in Pakistan.
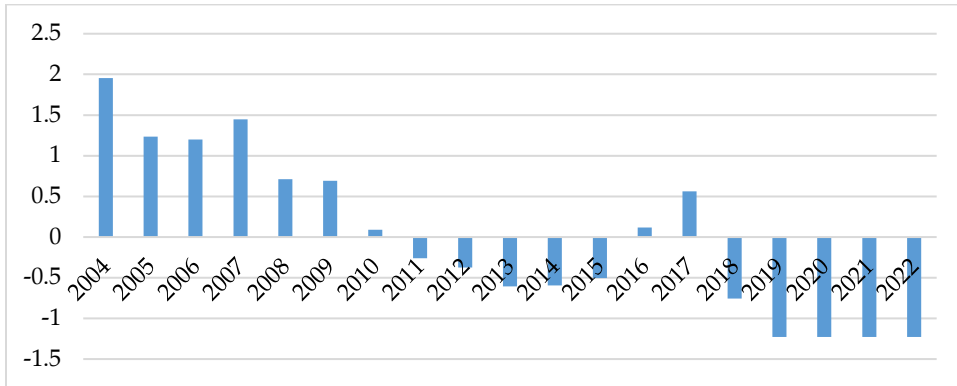
Figure 1: Political Regimes Mean Performance

Source: Author's calculations

Figure 2 illustrates the temporal evolution of the Inclusive Growth Index from 2004 to 2022, highlighting notable patterns. The figure shows a steady decline in inclusive growth levels until 2015, followed by an upward trend from 2016 to 2017. The fluctuations in the Inclusive Growth Index over time can be attributed to various economic, social, and political factors.

Positive economic policies, structural reforms, and initiatives aimed at fostering inclusive economic development can elevate the inclusive growth index. Simultaneously, the successful implementation of targeted social welfare programs designed to alleviate poverty and improve living conditions can positively influence inclusive growth. Similarly, efforts to reduce income inequality through measures such as progressive taxation and social safety nets may result in an increase in the inclusive growth index.

Conversely, policy uncertainties, insufficient reforms, or economic downturns can trigger a decline in inclusive growth. Ineffective or inconsistent social welfare measures, especially if they fail to reach their intended beneficiaries, may also lead to a reduction in inclusive growth. Despite the previous increase, the inclusive growth index faces another decline in subsequent periods, emphasizing the dynamic nature of inclusive growth trends and the impact of various factors over the specified time frame.

Figure 2: Inclusive Growth

Source: Author's calculations

8. Markov Regime Switching Technique

Pakistan is a developing nation facing instability in its economy and social sectors, marked by periods of both high and low economic growth under different government policies and priorities. A linear econometric model cannot effectively capture these structural changes. As demonstrated in the non-linearity test section, these variables exhibit nonlinear relationships. Popular methodologies for analyzing such relationships include ARDL and Markov regime switching techniques. In the case of Pakistan, the data reveals distinct high and low growth periods; thus, Markov regime switching techniques are employed to identify these periods and assess the influence of independent variables. The choice of two regimes is based on the volatility of the data during low and high growth. This technique automatically identifies both regimes, minimizing the chances of human error.

Here, the inclusive growth index is the dependent variable, while financial inclusion, remittances, FDI, budget deficit, and government effectiveness serve as independent variables. The specified Markov model is as follows:

$$\Delta igi = \alpha_i + \beta_i z_i + \epsilon_i \tag{4}$$

In this equation, IGI is the dependent variable, while Z is a vector of independent variables, along with an error term. Here, IGI represents the inclusive growth index. The independent variables include financial inclusion, government effectiveness, remittances, budget deficit, and

foreign direct investment, along with the error term. The equation for the determinants of inclusive growth that we used is given in Equation 5 below,

$$igi_t = \alpha + \beta_1 cifi + \beta_2 govn + \beta_3 rem + \beta_4 fdi + \beta_5 deft + \epsilon_t \qquad (5)$$

Where *igi* represents an index of inclusive growth, *cifi* refers to a composite index of financial inclusion, and *govn* indicates government effectiveness. Also, *rem* stands for remittances, *fdi* is foreign direct investment, and *deft* denotes the budget deficit.

The probability of the model remaining in one state ranges from 0 to 1, while the likelihood of shifting is indicated in the p column.

$$state = \begin{Bmatrix} 1=p_{11} \\ 2=p_{22} \end{Bmatrix} \qquad (6)$$

$$p = \begin{Bmatrix} p_{11} \, p_{12} \\ p_{21} p_{22} \end{Bmatrix} \qquad (7)$$

Regime 1 is characterized by low growth and high volatility, while Regime 2 features high growth and low volatility.
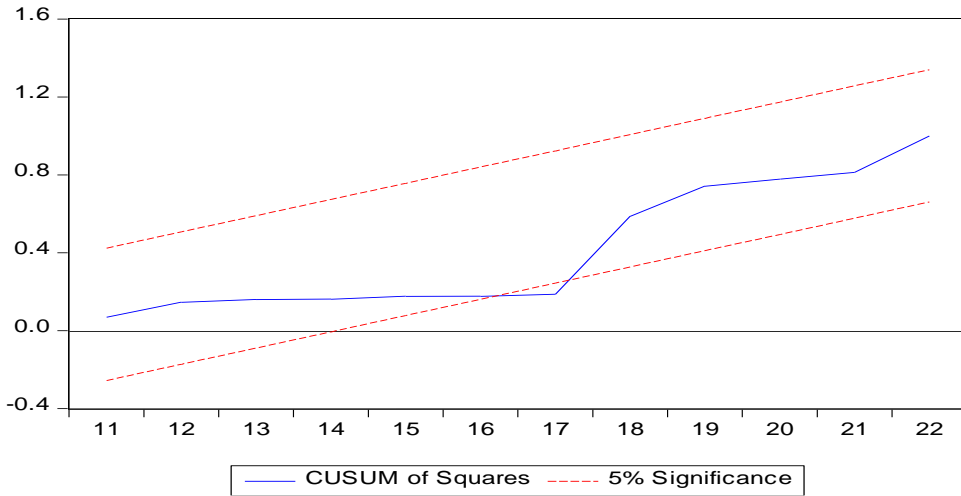
9. Preliminary investigation

9.1. Nonlinearity test

Nonlinearity occurs due to changes in mean or variance. It indicates that there is no direct relationship between variables. In such cases, linear models do not produce appropriate results. Literature suggests the need to specify a linear model first before taking further steps toward a nonlinear model. To determine whether a linear model is viable for the data, linearity tests were proposed during the selection of a nonlinear model (Teräsvirta, 1995). The following tests were performed to assess the nonlinearity of the data.

9.2. CUSUM Square test

The cumulative sum of squares of recursive residuals from square stability methods is used to test the stability of the Markov regime-switching model. The test results in Figure 3 indicate that the plots remain above the crucial lines for a significance level of 5%. Therefore, we can conclude that our model is not stable at the 5% significance level, as the blue line extends beyond the red line.

Figure 3. CUSUM Square Test

Source: Author's calculations.

9.3. BDS Test

The BDS test, proposed by Brock, Dechert, and Scheinkman, checks for nonlinearity in the model. Because it is highly effective against the regime-switching model, it can also be used to assess the model's validity.

The null hypothesis states that the series are independently and identically distributed around the mean. Table 4 presents the results of the BDS test. As shown in Table 4, all dimensions are significant at the 1% level. Therefore, the results indicate that inclusive growth and its determinants are nonlinear. Supported by the BDS test, the Markov regime switching model is utilized.

Table. 4: BDS Test Results

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.133	0.011	11.768	0.000
3	0.203	0.019	10.805	0.000
4	0.234	0.023	10.019	0.000

Source: Author's calculations

9.4. Unit Root Test

Stationarity is a crucial consideration for regime-switching models, such as the Markov regime-switching model. The requirement for

stationarity depends on the specific formulation of the model. In many time series models, such as regime-switching models, stationarity refers to the statistical properties of the time series that remain constant over time. Typically, stationarity is divided into two types:

Strict Stationarity: The joint distribution of any set of k random variables in the time series remains constant over time, and the statistical properties do not rely on the specific moment in time.

Weak Stationarity: The mean, variance, and autocorrelation structure remain constant over time; however, individual observations may not share identical distributions.

For many econometric models, including regime-switching models, assuming weak stationarity is common. This assumption simplifies the modeling process and helps ensure that the estimated parameters hold meaningful interpretations. However, some regime-switching models may relax the stationarity assumption in specific regimes. This is particularly relevant when modeling economic or financial time series data that may exhibit structural breaks, where the statistical properties of the data change across different regimes.

In a nutshell, while strict stationarity is not always required, the assumption of weak stationarity is often made or tested in regime-switching models to ensure the reliability of parameter estimates and the validity of statistical inferences. The specific requirements may vary based on the characteristics of the data and the assumptions of the model being used. We used the Augmented Dickey-Fuller technique to test the stationarity of variables. Results are presented in Table 5.

Table. 5: Unit Root Test Results

Variables	Level	First difference	Decision
IGI	-1.712*	-3.982***	I(0)
IFI	-0.068	-3.318**	I(1)
GOVN	-1.569	-2.293**	I(1)
REM	-1.021**	-3.906***	I(0)
FDI	-1.144	-2.613**	I(1)
DEFT	-3.168**	-4.895***	I(0)

Note: *, **, *** denotes the probability results at 10%, 5%, and 1% levels of significance.
Source: Author's calculations.

9.5. Multicollinearity Test

A Variance Inflation Factor (VIF) analysis was conducted to assess the potential risk of multicollinearity in the data. The VIF quantifies how much the variance of an estimated regression coefficient increases due to multicollinearity. A VIF value exceeding 10 (or, in some cases, 5) is typically deemed indicative of problematic multicollinearity, although thresholds may vary depending on the field of study.

Table. 6: VIF

Variable	VIF
IFI	4.14597
DEFT	3.752
FDI	4.16955
GOVN	2.90718
REM	3.91493
C	NA

Source: Author's calculations.

The results indicate that all variables have VIF values below the commonly used threshold of 5. This suggests that multicollinearity is not a significant concern in this dataset. The VIF analysis supports the robustness of the regression results by confirming that multicollinearity does not pose a substantial issue. This finding aligns with the assumptions of the regime-switching model and ensures the stability of coefficient estimates.

10. Results and Discussion:

The Markov regime-switching approach was employed to analyze the impact of financial inclusion, government effectiveness, capital inflow, and fiscal deficit on inclusive growth. Due to the constraints of the small sample size, the model is restricted to only two regimes. Test results are presented in Table 7.

Table. 7: Result

Variable	Coefficient	Std. Error	Prob.
Regime 1			
IFI	0.838*	0.438	0.056
GOVN	3.916***	0.434	0
REM	-0.377***	0.043	0
FDI	0.481***	0.073	0
DEFT	0.120***	0.018	0
C	3.717***	0.432	0
LOG(SIGMA)	-3.574***	0.25	0
Regime 2			
IFI	-10.403***	2.127	0
GOVN	2.438***	0.681	0
REM	-0.052	0.114	0.646
FDI	-0.17	0.108	0.117
DEFT	0.06	0.061	0.329
C	4.620***	0.574	0
LOG(SIGMA)	-1.465***	0.213	0

NOTE: *, **, *** denotes to the probability results at 10%, 5% and 1% levels of significance.
Source: Author's calculations.

The results displayed in Table 7 indicate that regime 1 represents a low-growth and high-volatility state, characterized by a low mean value (μ = 3.717) and high volatility (σ = 3.574). Conversely, regime 2 signifies a period of high growth and low volatility, shown by a high mean value (μ = 4.620) and low volatility (σ = 1.465). Therefore, it can be inferred that the low-growth regime is associated with high volatility, while the high-growth regime correlates with low volatility in our sample data.

The model illustrates that financial inclusion significantly impacts inclusive growth. During periods of low inclusive growth, financial inclusion positively influences the promotion of inclusive growth. In such times, the economy faces a slowdown. People require funds to operate their businesses and meet basic needs. Conversely, investment slows down as individuals begin depositing money in banks. In both scenarios, the supply and demand sides of financial inclusion and their role in fostering inclusive growth increase. This helps maintain living standards. Additionally, capital remains fluid, generating economic opportunities even during periods of low growth.

However, during the expansion period, financial inclusion had a highly significant negative impact on inclusive growth. As emphasized by Zulifqar et al. (2016), the current state of financial inclusion in Pakistan is

not effective in enhancing the level of benefit sharing and does not facilitate participation among socially excluded groups. In Pakistan, this variable remains too weak to support inclusive growth. Additionally, the availability of other borrowing and investment opportunities during periods of high growth exacerbates this weak variable's impact on inclusive growth and negatively affects it. Our findings align with those of Zulifqar et al. (2016), who discovered that making financial services accessible to all members of society fosters and promotes "sustainable inclusive economic growth" for everyone. Furthermore, they argued that providing access to new economic opportunities enables individuals to use resources effectively. Saleem et al. (2022) found that financial inclusion also encourages green growth, in agreement with Sarma (2011), who noted that financial inclusion significantly influences human development, infrastructure, inequality, literacy, and physical infrastructure. Evidence from Naumenkova et al. (2019) indicates that financial inclusion is negatively associated with poverty and inequality in Ukraine.

Government effectiveness has the largest, statistically significant, positive effects on inclusive growth during both high and low inclusive growth periods. In low growth periods, government effectiveness has the greatest impact on inclusive growth. Conversely, in high growth periods, its impact on economic growth is still high but relatively less pronounced. An effective government earns the trust of the public, promotes justice, and enhances overall happiness. This encourages people to invest and ensures the effective use of public expenditure. Thus, government effectiveness fosters a just, equal, and sustainable society. These findings align with Kosack and Tobin (2006), who demonstrated that government policies and development spending positively influence human development. Democracy, characterized by a government that is representative and accountable, also independently fosters human development. Haas (2007) emphasized that if the state fails to implement social and economic reforms, other factors such as remittances will not contribute to sustainable development. This indicates that government effectiveness directly and indirectly impacts inclusive growth. Moreover, effective government policies can enhance the productivity of remittances and foreign direct investment (FDI) for inclusive growth. Promoting the use of remittances for productive purposes and encouraging new investment ventures, such as CPEC, will be highly beneficial.

Remittances have a significant negative impact on inclusive growth during low-growth periods. In high-growth periods, they do not significantly affect inclusive growth. Our results align with those of

Fransen and Mazzucato (2014), who found that households primarily spend remittances on nonproductive assets, such as food security and living conditions. This creates a gap between financially secure and financially insecure groups during low-growth periods, thereby increasing inequality and affecting inclusive growth. Haas (2007) states that migration and remittances do not solve structural development problems. Furthermore, while remittances and migration may not contribute to nationwide sustainable development, migration itself should not be blamed for lower levels of development. Nevertheless, policies aimed at sustainable development can enhance the contribution of remittances. For instance, financial inclusion options like the Roshan digital account enable overseas Pakistanis to invest directly in Pakistan and utilize their income productively.

FDI has a significant positive impact on inclusive growth during periods of low growth. In contrast, it does not significantly influence inclusive growth in high growth periods. Generally, investment boosts employment and dollar assets in a country like Pakistan. However, it is crucial that investments are made wisely. If these investments are spent on purchasing existing properties without generating new economic activities, they will not affect the level of inclusive growth. Only new business ventures can effectively eradicate poverty, reduce inequality, and improve living standards. Simply transferring ownership from one party to another does not provide a solution. This situation also necessitates a thorough analysis of FDI expenditures in Pakistan. Our findings align with those of Silajdzic and Mehic (2016), who found that FDI positively impacts economic growth in an exogenous manner. However, its effects are more pronounced when the host country possesses adequate absorptive capacity, which is evident during low growth periods. When labor is inexpensive, the market anticipates future growth. Additionally, our findings correspond with those of Kosack and Tobin (2006), who asserted that aid and FDI cannot replace development efforts in poor countries; they cannot be viewed as complementary. This dynamic not only impedes economic growth but also hinders human development.

Finally, results indicate that budget deficits have a significant positive impact on inclusive growth during low-growth periods. Increased fiscal spending leads to greater cash flow. In a low-growth period, when the economy is experiencing a slowdown, this spending acts like a booster dose. Additionally, during such periods, policies and spending are aimed at providing relief to the general public, which directly influences inclusive growth by reducing poverty and bridging inequality. However, budget

deficits do not significantly affect inclusive growth in high-growth periods. In a time of economic prosperity, most public spending is directed toward long-term projects, which are not expected to provide immediate relief or maintain the living standards of the general public. This is why budget deficits show limited effects during high growth. Our results align with those of Toriola et al. (2022), who found that fiscal deficits positively impact inclusive growth. Specifically, lower taxes and higher fiscal spending foster growth.

11. Transition Probabilities

Table 8 illustrates the dynamics of a two-regime Markov regime-switching model with constant transition probabilities and expected durations. The model features probabilities for transitioning between states, along with the average durations spent in each state. The table consists of two rows and two columns, representing the two states or regimes of the Markov process. The values in Table 8 show the probabilities of moving from the current state (indicated by the row) to the next state (indicated by the column).

For instance, the probability of transitioning from State 1 to State 1 is 0.84.

The probability of transitioning from State 1 to State 2 is 0.15.

The probability of transitioning from State 2 to State 1 is 0.07.

The probability of transitioning from State 2 to State 2 is 0.92.

A higher likelihood of remaining in one regime illustrates the effectiveness of policy implementation and reduces volatility. This also indicates the existence of significant barriers that prevent the economy from transitioning from low growth to high growth. Such barriers may include low financial literacy and the inefficiency of financial institutions. These probabilities remain constant, signifying they do not change over time. The total of the probabilities in each row equals 1, reflecting that the system must transition to one of the potential states.

12. Constant Expected Duration

Table 8, titled "Constant Expected Durations," presents the average time spent in each state before transitioning to the other. It contains two rows for the states and two columns for the expected durations.

The expected duration in State 1 before transitioning to another state is 6.32 time units.

The expected duration in State 2 before transitioning to another state is 13.99 time units.
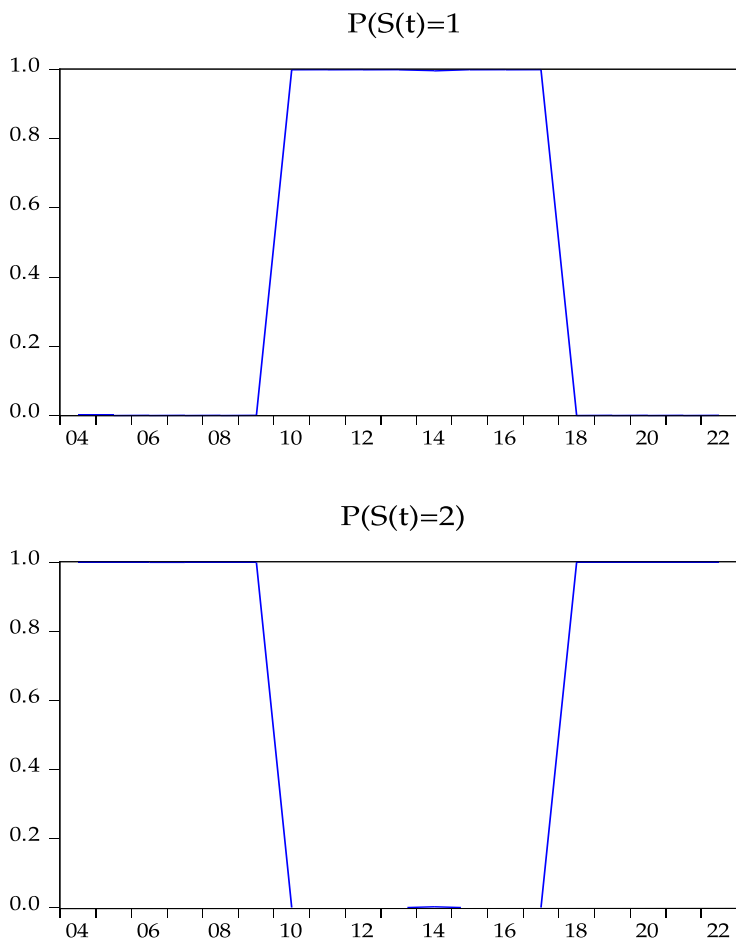
These expected durations offer an average measure of the time spent in each regime before a transition occurs.

Table 8: Constant Transition Probabilities

	1	2
1	0.84	0.15
2	0.07	0.92
	Constant expected durations:	
	1	2
	6.32	13.99

Source: Author's calculation.

To explore the temporal dynamics of the model, smoothed transition probabilities are shown in Figure 4a and Figure 4b. In Figure 4a, the period from 2009 to 2018 corresponds to regime 1, and the graph illustrates the smoothed transition probabilities for this regime over time. Meanwhile, Figure 4b focuses on regime 2, which spans from 2010 to 2017. These figures effectively depict how the probabilities of being in each regime evolve throughout the entire transition phase. The x-axis likely indicates the time period, while the y-axis represents the smoothed transition probabilities.

Figure 4a & 4b: Markov Switching Smoothed Regime Probabilities

P(S(t)=1)

P(S(t)=2)

Source: Author's calculations.

13. Conclusion

The primary objective of this study was to explore the relationship between inclusive growth and financial inclusion in Pakistan, employing a comprehensive variable for inclusive growth. The dataset covered the period from 2004 to 2023, limited by the availability of financial inclusion data after 2004. The UN methodology was used to calculate the inclusive growth index, while Sarma's (2015) approach was applied for the financial inclusion index. Control variables included government effectiveness, foreign direct investment (FDI), remittances, and budget deficit. The study utilized the Markov regime-switching technique to address data non-linearity and discern the relationship between variables across different regimes.

The graphical representation revealed a gradual decline in inclusive growth across all political regimes, contrasted with an increase in financial inclusion throughout various political eras. PPP's governance demonstrated the highest effectiveness, while PMLQ ranked as the least effective government. PMLN and PTI were positioned as the second and third most effective governments, respectively. Over time, the plots of inclusive growth displayed a declining trend until 2016 and 2017, followed by a significant improvement. However, post-2018, inclusive growth experienced a gradual decrease.

Empirical results indicated a noteworthy finding: financial inclusion had a significant positive impact on inclusive growth during low-growth periods. Interestingly, in high-growth periods, financial inclusion exhibited a significant negative impact on inclusive growth. Government effectiveness consistently played a positive role in both low and high-growth periods, with a more pronounced effect during low-growth periods. Remittances showed a significant negative effect on inclusive growth in low-growth periods but lacked significant impact during high-growth periods. Both FDI and budget deficits positively influenced inclusive growth in low-growth periods, while showing no significant effect in high-growth periods.

In summary, this study offers valuable insights into the nuanced relationships among inclusive growth, financial inclusion, and various control variables in Pakistan. The application of the Markov regime-switching technique enhances our understanding of how these relationships evolve across different economic and political regimes.

14. Policy Implications and Recommendations

Based on our findings, we offer the following policy recommendations.

- Expand financial literacy programs, such as the National Financial Literacy Program by the State Bank of Pakistan, focusing on underserved populations like women and rural communities. Achieve this through partnerships with local organizations and utilizing digital platforms for education.

- Introduce targeted subsidies for digital financial literacy, especially during low-growth periods, to empower individuals with knowledge and tools to access and effectively utilize financial services.

- Develop strategies to promote digital financial inclusion, particularly during high-growth periods when financial inclusion negatively impacts inclusive growth. For instance, encourage the use of mobile banking and e-wallets while addressing infrastructure gaps in rural areas.

- Recognize and integrate the growing influence of Islamic finance within Pakistan's financial ecosystem. Promote Sharia-compliant financial products that cater to the preferences of a significant segment of the population, thereby enhancing financial inclusion.

- Collaborate with Islamic financial institutions to create products specifically aimed at reducing socio-economic disparities, such as microfinance programs for small businesses.

- During economic downturns, prioritize the expansion of financial access in rural areas through mobile banking infrastructure and incentivize private sector involvement. Design and implement inclusive policies that channel remittances into productive investments rather than consumption, thus addressing inequality and enhancing long-term growth prospects.

- Strengthen governance and regulatory frameworks to ensure that financial services are equitably distributed and effectively utilized.

- Regularly monitor and adapt financial inclusion policies according to economic phases, using insights from regime-switching models to tailor interventions.

15. Limitations

Though this study offers valuable insights into the relationship between financial inclusion and inclusive growth in Pakistan, several limitations must be acknowledged:

Data Constraints: The study relied on data from 2004 to 2022 due to the initiation of the financial access survey in 2004. This limitation restricted the temporal scope of the analysis and may not fully reflect long-term trends.

Principal Component Analysis (PCA): The creation of the composite indexes using PCA necessitated complete datasets. To address issues of missing data, linear interpolation was utilized. Although this approach ensured a more comprehensive representation of the data, it may have

introduced some bias or reduced variability in the analysis. The discussion on the limitations of the constructed indexes will be further developed by examining the sensitivity of results to the inclusion or exclusion of specific indicators. PCA mitigates multicollinearity by transforming correlated variables into uncorrelated principal components; the potential impacts of strong correlations among original indicators on the derived components and their interpretations will also be thoroughly examined.

Exclusion of Variables: Due to data unavailability, certain variables that could influence inclusive growth, such as regional disparities, technological advancements, or social capital indicators, were excluded from the analysis.

16. Future Research Directions

To address these limitations and build on the findings of this study, future research could explore the following:

Incorporation of Additional Variables: Future studies could include factors such as digital financial literacy, regional disparities, and technological advancements to provide a more comprehensive analysis of inclusive growth.

Improved Handling of Missing Data: Future studies could investigate alternative imputation techniques or utilize advanced methods, such as multiple imputation or machine learning algorithms, to address missing data in PCA and other analyses.

Context-Specific Analyses: Conducting comparative studies across regions or developing country contexts could yield deeper insights into the applicability of the findings to other economies.

Policy Simulation: Exploring the potential impacts of proposed financial inclusion policies under various economic scenarios could enhance the practical relevance of the findings.By addressing these areas, future research can refine the understanding of the intricate relationship between financial inclusion and inclusive growth and contribute to more effective policymaking in Pakistan and similar developing economies.

17. Disclosure statement

There is no competing interest to declare by the authors.

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