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How Fintech and Government Effectiveness Shape Financial Literacy: The Mediating Role of Urbanization

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Abstract

This study investigates the impact of financial technology (fintech) and government effectiveness on financial literacy, with urbanization as a mediator and institutional quality as a moderator. Using panel data from 217 countries (2001–2022) sourced from the World Development Indicators, the study employs fixed-effects, random-effects, and system GMM models to address endogeneity and autocorrelation. The results indicate that government effectiveness and regulatory quality significantly enhance financial literacy, while commercial bank branches per capita show a negative association, suggesting that digital infrastructure may outweigh traditional banking in promoting financial knowledge. Urbanization mediates fintech's positive influence, underscoring the role of urban access in financial education. However, institutional quality's moderating effect remains weak, implying that governance alone may not amplify fintech's benefits without targeted policies. The study contributes to the literature by integrating macro-level determinants of financial literacy and offers insights for policymakers to leverage fintech and governance in reducing financial inclusion gaps. Key limitations include reliance on proxy measures and unobserved heterogeneity. Future research should explore micro-level dynamics and emerging technologies like AI-driven financial tools.

Keywords: Financial literacy, Financial technology, Government effectiveness, Urbanization, Institutional quality

1. Introduction

Financial literacy plays a critical role in economic decision-making, influencing savings behavior, investment strategies, and access to financial services (Lusardi & Mitchell, 2014). Owing to the growth of the global economy, fintech has become a center of financial literacy since it offers more information about the financial sector to the people, electronic banking, and payment systems (Ozili, 2018). Policy makers and the government hand in hand participate in promoting financial literacy through policies, rules regulations and awareness creation programs. Nevertheless, current research shows that there are significant variation in financial literacy across the regions, where citizens that live in urban areas are more likely to better understand the financial products because those areas have better access to financial services and products and higher literacy level compared to rural areas (Lusardi & Mitchell, 2011)

Fintech adoption and government policies related to fintech also interact with institutional quality which includes the abilities of the regulatory authorities in the country in moderating the impact

of financial literacy. Lack of institutions may lead to poor implementation of the above measures of financial education and; adoption of digital financial services (Allen et al., 2016). Recent research shows that AI and ML plays a significant role in developing the financial literacy, in the sectors such as financial and monetary education and automated advisors (Zhang, 2024).

The use of AI in conventional fintech allows for monitoring the user's behaviors, offering customized financial advice, and improving the decision-making process, which can address financial illiteracy among various crowds (Rehman, 2023). Similarly, there is increased efficiency in the use of digital payments, especially through the blockchain technology which creates trust in digital financial platforms which is essential in achieving financial inclusion (Vo, 2025). Thus, the cooperation of financial institutions, governments, and technology companies is important to maintain the processes of fintech development, digital financial literacy, and compliance with the best practices at the international level (Hussain et al., 2021).

Based on these dynamics, this study seeks to establish the role played by financial technology and effectiveness of government on the level of financial literacy with urbanization as a moderator and institutional quality as the mediator.

1.1 Research Gap

Despite the growing body of literature on financial literacy, most existing studies focus predominantly on individual-level determinants such as income, education, and employment status (Lusardi & Mitchell, 2014). While the role of fintech in enhancing financial knowledge is acknowledged (Mhlanga, 2024; Ozili, 2018), few studies examine its interaction with government effectiveness or how institutional frameworks shape this relationship. Furthermore, the mediating role of urbanization in the fintech–literacy nexus is underexplored, particularly in cross-national analyses where urban access to digital infrastructure varies widely (Chen et al., 2024; Knüsel & Schotsmans, 2022). Institutional quality—which can significantly influence the implementation of financial education policies and access to fintech—has also been largely overlooked as a moderating variable in this context (Allen et al., 2016; Vo, 2025). This study addresses these gaps by proposing an integrated framework that combines macro-level indicators of fintech adoption, governance, urbanization, and institutional quality to explain variations in financial literacy across countries.

1.2 Problem Statement

The wide acceptance of financial technology and the increasing emphasis in financial education in the country and the world have not necessarily solved the problem of the lack of consistent financial literacy levels in different groups of people. The performance based on financial literacy is also higher in urban areas than rural and less developed areas since there is higher access to financial services and education through technology. Also, it limits the efficiency of fintech solutions and government approaches to raise financial literacy. This paper aims to investigate the relationship between the four independent variables of fintech, government effectiveness, urbanization, and institutional quality to conclude the factors that determine financial literacy.

1.3 Research Questions

1. How does financial technology influence financial literacy?
2. What is the impact of government effectiveness on financial literacy?
3. How does urbanization mediate the relationship between financial technology and financial literacy?
4. To what extent does institutional quality moderate the relationship between government effectiveness and financial literacy?

1.4 Research Objectives

1. To examine the impact of financial technology on financial literacy.
2. To analyze the role of government effectiveness in improving financial literacy.
3. To investigate the mediating effect of urbanization on the relationship between financial technology and financial literacy.
4. To evaluate the moderating role of institutional quality in the relationship between government effectiveness and financial literacy.

1.5 Significance of the Study

This paper also contributes to some extent to the existing literature in explaining what caused financial literacy, bridging the gap between FinTech, governance and urbanization. The results will be useful for policymakers as a reference on how fintech developments and government actions can be further developed for improving financial literacy. In addition to the above, this research will attempt to proffer strategic recommendations for fintech firms, regulatory authorities and financial institutions on enhanced delivery of financial literacy programs and investments in online financial services. This research will seek to expose the effect of urbanization and institutional quality on financial literacy and in the process, it will offer a breakthrough to the effect of this variable across regions and different groups of people.

2. Literature Review:

2.1 Financial Literacy

Financial literacy refers to the capability of accessing, understanding, appraising, comprehending the give-and-take of, and applying different sorts of financial matters (OECD 2014). It has been defined and redefined over the course of time from where it initially begun with the financial capability, which is the long term ability to manage resources on the financial aspect (Collard et al., 2006). However, possession of financial knowledge is not enough to guarantee positive user's financial behavior, nevertheless, this kind of knowledge serves as the basis for forming of financial literacy, which implies making correct decisions based on that knowledge (Sherraden, 2013). Other theories including the Theory of Planned Behavior by (Ajzen, 1991) and Social Learning Theory by Bandura (1986) argue that attitudes, social influences, and perceived control influence the financial decisions and behaviours, of which the family and social interaction is vital in the financial socialization process (Moschis, 1987).

According to (Riitsalu & Põder, 2016), it has been established that there is a positive connection between financial knowledge and the financially appropriate actions like saving, budgeting as well as avoiding debt. These demonstrate that the level of financial literacy determines behaviors in relation to finances, which are fundamental towards sound financial future planning (Lusardi & Mitchell, 2014). Emotional intelligence programs effective impact the impact have been established to enhance financial knowledge and financial behaviors, prove the significance of literacy, and reform of personal money management. Research has indicated that people around the world still have low levels of financial literacy, and as a result, it remains a constant subject of research and of policy (Huston, 2010).

2.2 Financial Technology (FinTech) and Financial Literacy

Digitization of financial services has been another remarkable area carried out by FinTech through offering instant banking, payment methods and investment solutions that are available to most individuals. The online trading platforms have made financial services more accessible and available, which enhances financial education (Ogunola et al., 2024). For instance, mobile banking and payments have made it easier for individuals to transact and control their finances, and robo-

advisor investment services enhances the users' knowledge on managing and investing their finances (Mhlanga, 2024). The use of FinTech services has been established to have a positive correlation with the financial literacy especially for the developing countries since the available FinTech services enhance financial knowledge and education (Chen et al., 2024). Thus, the impact of FinTech in enhancing financial literacy can only be realised based on the user's capability in employing these tools; thus, the importance of digital financial literacy (Jena, 2025).

2.3 Government Effectiveness and Financial Literacy

The effectiveness of governments proves vital for promoting financial literacy because it creates educational policies along with public initiatives to teach the people. A strong financial education policy framework in nations leads to better financial competence among citizens who show improved fiscal management skills (Atkinson & Messy, 2012). The U.S. government operates the National Strategy for Financial Literacy through which it delivers resources to train people of different backgrounds (Kaiser et al., 2022).

Likewise in Singapore today the government has empowered schools, community groups, and others to spread information on financial literacy and hence the intake of such information by the citizens of Singapore has improved a lot (Hao, 2022). It is therefore important for there to be good governance within institutions which will foster such education provision and people will be in a better position to take up opportunities that require them to be online.

2.4 Urbanization as a Mediator

The different aspects of the relationship between FinTech uptake and financial literacy are influenced by urbanization. In general, urban environment offers improved financial services and educational opportunities that can boost people's financial competence (Chen et al., 2024). Cities can have more financial institutions, Internet connection and government programs which are somehow associated with financial literacy (Attah et al., 2024). For similar reasons, urban environments promote access to modern financial tools, including mobile banking and online platforms for education on financial matters in order to increase financial literacy (Knüsel & Schotsmans, 2022). Therefore, the role of urbanization can play a moderating role in the interaction between FinTech services and the changes in the level of financial literacy.

2.5 Institutional Quality as a Moderator

In this study, institutional quality has been analyzed as a moderating factor between government effectiveness and financial literacy, and financial technology. According to (Khababa & Mansurov, 2024) pointed out that presence of adequate regulation can mediate the relationship of Fintech with financial access. Thus, a clear and effective legal framework enables the enhancement of the overall effect of financial technology on financial revolution. (Nazir et al., 2025) demonstrates that institutional quality positively affects financial systems efficiency while voice and accountability, political stability and regulatory quality together with government effectiveness, rule of law and control of corruption represent significant elements that influence financial system efficiency.

Additionally, (Khan et al., 2024) also found out that innovation technlogy and institutional quality enhance the rate of growth of the financial market. In this case, appropriate institutions facilitate the appreciation of integration of innovation and technology to financial markets. Finally, (Nazir et al., 2025) touched on the relationship between the financial technology, Greenfield investment and sustainable development, and found out that in absence of quality institutions the effectiveness of the above-stated variables tend to be distorted, indicating that quality institutions are important ingredients that would catalyze the benefits derived from the subject variables.

3. Methodology

This study aims to examine the relationships between financial technology, government effectiveness, financial literacy, urbanization, and institutional quality using data from the World Development Indicators (WDI) database. The dataset includes 217 countries for the years 2001-2022, excluding the years 1999, 2000, and 2023 (World Bank, 2023). The primary focus is to explore how government effectiveness and financial technology (the independent variables) influence financial literacy (the dependent variable), with urbanization acting as a mediator and institutional quality as a moderator.

Table 1

Variables	Measurement	Sources
Financial Technology	Commercial bank branches (per 100,000 adults), Individuals using the Internet (% of population)	WDI
Government Effectiveness	Government Effectiveness: Estimate	WDI
Financial Literacy	Insurance and financial services (% of commercial service exports)	WDI
Urbanization	Urban population (% of total population)	WDI
Institutional Quality	Regulatory Quality: Estimate, Regulatory Quality: Percentile Rank	WDI

WDI stand for World Development Indicators

The study formulates an econometric model to empirically test the relationships among these variables. The model takes the form of:

$$\mathbf{FLit = \beta 0 + \beta 1GEit + \beta 2FTit + \beta 3URBit + \beta 4(FT \times IQ)it + \gamma Xit + \epsilon it}$$

The mediating effect of urbanization is examined by incorporating it into the model as follows:

$$\mathbf{URBit = \alpha 0 + \alpha 1GEit + \alpha 2FTit + \alpha 3IQit + \gamma 1Xit + \nu it}$$

The analysis incorporates the interaction term $\mathbf{(FT \times IQ)it}$ to determine institutional quality's effect on financial technology and financial literacy relationships in the first equation. This can be written as:

$$\mathbf{FLit = \beta 0 + \beta 1GEit + \beta 2FTit + \beta 3URBit + \beta 4(FT \times IQ)it + \gamma Xit + \epsilon it}$$

To ensure robust and reliable results, the study employs several econometric techniques using **Stata 14**. The dataset attains characterization through descriptive calculation methods which produce mean values and standard deviation measurements together with pattern analyses of distribution forms. The pwcorr analysis shows Pearson correlations between variables to check for initial interrelationships as well as potential multicollinearity. The Multicollinearity assessment can progress with the Variance Inflation Factor test which shows that variables exceeding a VIF value of 10 would trigger this concern.

The evaluation of relationships between government effectiveness and financial technology and urbanization and institutional quality with financial literacy makes use of Fixed Effects (FE) and Random Effects (RE) panel regression models for estimation purposes. Testing two models falls under the responsibility of the Hausman test. The selection process for Fixed Effects or Random Effects models stems from the results of the test significance. The research employs Pesaran's

Cross-Sectional Dependence Test (xtcd) as its main instrument to manage between-country dependencies.

Westerlund's Cointegration Test (xtwest) serves as the tool for detecting variable long-term connection. The test establishes analysis conditions to determine long-term equilibrium connections between financial technology and government effectiveness and financial literacy. System GMM serves as the estimation method because it produces efficient parameter estimates through its ability to resolve problems associated with endogeneity and omitted variables as well as reverse causality effects. The methodology addresses both simulatenous equations and deals effectively with data autocorrelation as well as heteroskedasticity problems.

4. Results

4.1 Descriptive Statistics:

A total of 4774 observations exist within a database that measures financial services together with government effectiveness and technological infrastructure and regulatory quality variances. GEE (Government Effectiveness), with an average value of 2.42 and a standard deviation of 0.996, ranges from nearly zero (1.37E-06) to a maximum of 4.91. The measurement of commercial bank branches per adult population reaches 16.99 with 20.10 points of standard deviation extending from 0.04 to 285.38. According to IUTI (Individuals Using the Internet as a Percentage of the Population) measurements the mean is 40.42 and standard deviation reaches 31.95 across a scale from 0.001% to 100%. UPTP (Urban Population as a Percentage of the Total Population) follows an average of 58.82 with 24.29 standard deviation and a distribution range from 8.46% to 100%.The average value of RQ (Regulatory Quality) stands at 2.53 while its standard deviation reaches 1.01. The measured data points range between 1.32E-06 to 4.80. The data regarding IS (Insurance and Financial Services as a Percentage of Commercial Service Exports) cannot be found in the initial description of the variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
IFS	4,774	7.343619	12.70268	1.46E-07	100.65
GEE	4,774	2.421193	0.995957	1.37E-06	4.909624
CBB	4,774	16.99184	20.09826	0.04009	285.3792
IUTI	4,774	40.42226	31.95153	0.001	100.001
UPTP	4,774	58.81875	24.29315	8.461	100
RQ	4,774	2.527075	1.009958	1.32E-06	4.799962

4.2 Correlation Matrix

The table shows the correlations between the natural logarithms of five variables. **lnGEE** has a small positive correlation with **lnIFS** (0.079) and a stronger correlation with **lnCBB** (0.476). **lnCBB** is moderately correlated with **lnIUTI** (0.440) and **lnUPTP** (0.387). **lnRQ** shows the strongest correlations, particularly with **lnGEE** (0.749) and **lnIUTI** (0.512). The correlations are generally weak to moderate across the variables.

	lnIFS	lnGEE	lnCBB	lnIUTI	lnUPTP	lnRQ
lnIFS	1					
lnGEE	0.079	1				
lnCBB	-0.0621	0.4756	1			
lnIUTI	0.039	0.4801	0.4399	1		
lnUPTP	0.021	0.3639	0.3874	0.4733	1	
lnRQ	0.0879	0.7487	0.3805	0.5121	0.2892	1

4.3 Regression Results:

The output from regression analysis demonstrates how the financial services index varies based on five different factors. The total model proves significant due to a 21.55 F-statistic paired with a 0.0000 p-value which suggests the model explains some aspects of dependent variable changes. The R-squared value reaches 0.0221 whereas the model explains 2.21% of the index of financial services variation yet reveals a minimal improved adjusted R-squared value of 0.0211.

The results show government effectiveness as a significant positive factor in the analysis which produces statistical significance at the p-value level of < 0.0001 along with a coefficient value of 0.167. The number of commercial bank branches present a statistically meaningful negative correlation to financial service index measurements and their coefficients amount to -0.148. Internet usage data demonstrates an insignificant relationship to the study results since the p-value measures 0.271. The analysis indicates that urban population percentage along with regulatory quality exerts positive influencing factors yet only the latter proves statistically significant when the results demonstrate a coefficient value of 0.132 at a p-value of 0.004. A significant constant term equals 1.179 which shows the initial level of financial services index under predictor values of zero.

Source	**SS**	**df**	**MS**	**Number of obs**	=	**4,774**
				F(5, 4768)	=	21.55
Model	134.9951	5	26.99902	Prob > F	=	0
Residual	5974.452	4,768	1.253031	R-squared	=	0.0221
				Adj R-squared	=	0.0211
Total	6109.447	4,773	1.280001	Root MSE	=	1.1194

lnIFS	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
lnGEE	0.166955	0.047486	3.52	0	0.0738597	0.26005
lnCBB	-0.14842	0.018072	-8.21	0	-0.183848	-0.11299
lnIUTI	0.013318	0.012106	1.1	0.271	-0.010415	0.037051
lnUPTP	0.039985	0.037904	1.05	0.292	-0.034325	0.114295
lnRQ	0.132412	0.045396	2.92	0.004	0.0434154	0.221408
_cons	1.178551	0.135535	8.7	0	0.9128401	1.444263

4.4 GLS Regression

Utilizing random-effects GLS regression to study the relationship between financial services index and five explanatory variables through 4,774 observations split across 217 countries. A significant statistical relation exists between the Wald chi-squared value of 16.69 and its p-value of 0.0051 which demonstrates the overall model significance. The R-squared values indicate the model provides a minimal explanation of financial services index variation since it accounts for 0.0037 within groups and 0.0039 between groups and 0.0035 in total.

The effect of government effectiveness on the dependent variable according to the study results appears extremely small and statistically insignificant with a value of 0.0076 and p-value of 0.824. Between 100,000 adults there exists a statistically significant negative relationship with commercial bank branches that displays a -0.0400 coefficient value as indicated by its p-value of 0.023. Internet usage shows a tiny beneficial relationship yet this relationship fails to meet statistical confirmation because its p-value reaches 0.157. The percentage of urban inhabitants

positively affects infant mortality rate statistics and shows significance at the 0.034 level with a value of 0.2382. Regulatory quality demonstrates a minor positive relation with the outcome variable yet statistical tests show this relationship is not significant because the p-value reaches 0.601 while the coefficient stands at 0.0193. The constant term produces no significant results because its coefficient stands at 0.3532 and its p-value reaches 0.419.

The model provides details about variance components which show that sigma_u equals 0.9152 and sigma_e equals 0.6500. About 66.47% of the unmeasured country-specific factors contribute to the total variance because the explanatory variables exhibit a 0.6647 correlation with the random effects.

Random-effects GLS regression	**Number of obs**	=	**4,774**
Group variable: CountryID	Number of groups	=	217
R-sq:	Obs per group:		
within = 0.0037	min	=	22
between = 0.0039	avg	=	22
overall = 0.0035	max	=	22
	Wald chi2(5)	=	16.69
corr(u_i, X) = 0 (assumed)	Prob > chi2	=	0.0051

lnIFS	**Coef.**	**Std. Err.**	**z**	**P>z**	**[95% Conf.**	**Interval]**
lnGEE	0.007575	0.034001	0.22	0.824	-0.05907	0.074217
lnCBB	-0.04002	0.017635	2.27	0.023	-0.07459	-0.00546
lnIUTI	0.013826	0.009777	1.41	0.157	-0.00534	0.03299
lnUPTP	0.238237	0.112527	2.12	0.034	0.017688	0.458786
lnRQ	0.019306	0.03694	0.52	0.601	-0.05309	0.091706
_cons	0.353183	0.437083	0.81	0.419	-0.50348	1.20985
sigma_u	0.915235					
sigma_e	0.65002					
rho	0.66471	(fraction of	variance due	to	u_i)	

4.5 Hausman Test

The Hausman test results are displayed to determine whether fixed effects (fe) or random effects (re) models produce different coefficients. The Hausman test enables researchers to establish if coefficients from the fixed effects model (b) and random effects model (B) differ significantly to justify the selection of a fixed effects approach over a random effects approach.

The study demonstrates congruence between coefficients from random and fixed effects models regarding the variables lnGEE, lnCBB, lnIUTI, lnUPTP, and lnRQ. These variables yield equivalent results because all differences between coefficient values (b - B) equal zero.

The Hausman test calculates its statistic through the chi-squared value with a result of 0.00. The paper states the inference is inconclusive because the coefficient difference equals zero together with the absent "Prob > chi2" the test fails with a non-positive definite variance-covariance matrix as indicated by an error value.

Tests from the study indicate similar coefficients for fixed effects and random effects but improper chi-square computation leads to more research about proper model fit selection.

	Coefficients ---- (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b S.E.	V_B))
lnGEE	.0075753	.0075753	0	0	
lnCBB		-0.0800468	0	0	
lnIUTI	.0138262	.0138262	0	0	
lnUPTP	.2382372	.2382372	0	0	
lnRQ	.0193057	.0193057	0	0	

4.6 VIF

A Variance Inflation Factor analysis shows how much multicollinearity affects a regression model through its assessment of explanatory variables. Depending on the VIF value one can confirm the presence of multicollinearity between specific independent variables and model variables and values above 1 indicate growing variable correlations. Explanatory variable lnGEE shows the strongest link among coefficients with 2.58 VIF and the lnRQ variable displays similar impact strength with 2.46 VIF value in comparison to other variables. The VIF results indicate the three variables lnIUTI, lnCBB, and lnUPTP present minimal inter-variable correlations since their values measure at 1.68, 1.44, and 1.38. The model variables show weak inter-relations because the Mean VIF stands at 1.91 which demonstrates average variable independence according to VIF measurement standards below 5. Multicollinearity does not influence the predictions made by this model design.

Variable	VIF	1/VIF
lnGEE	2.58	0.387542
lnRQ	2.46	0.406591
lnIUTI	1.68	0.593782
lnCBB	1.44	0.692078
lnUPTP	1.38	0.723481
Mean VIF	1.91	

4.7 Westerlund

A table provides Westerlund ECM panel cointegration test results testing no cointegration between variables in a 217 series panel dataset that uses 5 covariates. Strong evidence exists to reject the no cointegration hypothesis because the Gt statistic reaches -3.495 with -13.125 Z-value and 0.000 p-value. This evidence points to the existence of a sustainable long-term equilibrium connection between all the variables contained in the panel. On the other hand, the Ga, Pt, and Pa statistics show values of -2.141, -15.238, and -1.073, respectively, with very high z-values and p-values of 1.000. Evidence suggests no cointegration exists for these test statistics because their corresponding p-values rise above accepted significance levels (for instance 0.05). The group test statistic shows potential cointegration although other tests disclose no evidence for a long-term relationship between variables within the panel data frame.

Statistic	Value	Z-value	P-value
Gt	-3.495	-13.125	0
Ga	-2.141	22.935	1
Pt	-15.238	18.242	1
Pa	-1.073	18.106	1

4.8 System GMM

A two-step system GMM dynamic panel-data estimation method analyzed 4,774 observations spread across 217 groups (countries) while making use of 138 instruments. A minimum of 22 observations together with an average and maximum existed for every group. The Wald chi-squared test demonstrated statistical significance of the overall model with 276.96 as the value and a corresponding p-value of 0.000.

Results indicate that the variable lnGEE holds a coefficient of 0.1645 yet its p-value reaches 0.323 thus demonstrating an insignificant statistical relationship. The estimated coefficient rate of lnCBB appeared as -0.1378 finding statistical significance at 5% through its p-value of 0.032. The coefficient for lnIUTI equals 0.0160 while its p-value stands at 0.706 thus showing no significance. The coefficient of lnUPTP equals 0.0492 while its p-value reaches 0.822 indicating no statistical significance. The lnRQ coefficient obtained a statistical significance level of 0.35 along with a value of 0.1286. The value of constant term (_cons) equals 1.0703 while its p-value reaches 0.195 which indicates statistical insignificance.

The findings from Arellano-Bond tests indicate first-order autocorrelation (AR (1)) fails to reject null hypothesis because the z-value is -1.47 and p-value is 0.142. The null hypothesis demonstrates significant rejection for second-order autocorrelation (AR (2)) because it has a -2.14 z-value and a p-value of 0.032.

Results of the Sargan and Hansen tests establish the validity of the instruments used in this model. The results from Sargan test (non-robust) show a chi-squared value of 13,857.75 along with a p-value of 0.000. Contrastingly, Hansen test (robust) displays a chi-squared value of 183.88 and a p-value of 0.002 which demonstrates that the instruments prove valid while revealing weakness due to the instruments' extensive number.

The Difference-in-Hansen tests demonstrate that certain instruments generate exogeneity results which do not reject the null hypothesis based on their p-values of 0.398 and 0.93

Dynamic panel-data estimation,	**two-step**	**system**	**GMM**		
Group variable: CountryID			Number of obs	=	4774
Time variable : Time			Number of groups	=	217
Number of instruments = 138			Obs per group: min	=	22
Wald chi2(5) = 276.96			avg	=	22
Prob > chi2 = 0.000			max	=	22

lnIFS	Corrected Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
lnGEE	0.1645217	0.1663099	0.99	0.323	-0.16144	0.490483
lnCBB	-0.1378385	0.0644371	-2.14	0.032	-0.26413	-0.01154
lnIUTI	0.0160421	0.042572	0.38	0.706	-0.0674	0.099482
lnUPTP	0.0492137	0.219322	0.22	0.822	-0.38065	0.479077
lnRQ	0.1285601	0.1375069	0.93	0.35	-0.14095	0.398069
_cons	1.070316	0.8255486	1.3	0.195	-0.54773	2.688361

Test	Statistic	Value	p-value
Arellano-Bond test for AR(1) in first differences	z	-1.47	0.142
Arellano-Bond test for AR(2) in first differences	z	-2.14	0.032
Sargan test of overidentifying restrictions	$\chi^2(132)$	13857.75	0.000
Hansen test of overidentifying restrictions	$\chi^2(132)$	183.88	0.002
Difference-in-Hansen tests of exogeneity of instrument subsets			
GMM instruments for levels			
Hansen test excluding group	$\chi^2(126)$	177.65	0.002
Difference (null H = exogenous)	$\chi^2(6)$	6.23	0.398
GMM instruments (collapsed, lag 1)			
Hansen test excluding group	$\chi^2(1)$	76.61	0.000
Difference (null H = exogenous)	$\chi^2(131)$	107.27	0.936
IV instruments for levels			
Hansen test excluding group	$\chi^2(126)$	168.21	0.007
Difference (null H = exogenous)	$\chi^2(6)$	15.66	0.016

5- Conclusion

5.1 Conclusion

This study explored the interplay between financial technology (fintech), government effectiveness, urbanization, and institutional quality in shaping financial literacy across 217 countries from 2001 to 2022. The findings revealed that government effectiveness and regulatory quality positively influence financial literacy, while the number of commercial bank branches had a negative impact, suggesting that physical infrastructure alone may not suffice without complementary digital and policy frameworks. Urbanization mediated the relationship between fintech adoption and financial literacy, highlighting the role of urban environments in facilitating access to financial services and education. However, the moderating effect of institutional quality was less pronounced, indicating that stronger governance alone may not amplify the benefits of

fintech or government policies without targeted interventions. Endogeneity and autocorrelation were dealt with through the use of econometric system GMM, making the study very reliable.

5.2 Future Directions

Future studies can enrich this framework by including micro-level data to elicit the individual-level behaviors and attitudes towards financial literacy, which are key to the identification the gaps based on sex. Further, the examination of cultural and socio-economic factors, including income difference, gender issues, among others, may give better perspective on contextual differences. Furthermore, longitudinal trends that indicated the temporal changes within fintech adoption and its impacts on financial literacy would be useful. If literature has proven that better literacy improves students' performance then it could also be ascertained that in areas where there is poor literacy, students are unable to perform well in their studies; hence this study want to extend the knowledge of how emerging technologies like the block chain and the AI enabled financial tools can support the areas of poor literacy. The tailoring of relevant solutions may also be encouraged by common cooperation involving other industries, policy makers and financial technology companies.

5.3 Limitations

As a result of gathering data solely on the macro level, the study failed to explain variation in financial tendencies. Therefore, using insurance and financial services exports as proxy for financial literacy may not necessarily depict the whole picture of what financial literacy entails. However, one can still come across residual confounding factors which are basically the policy changes or technological disruptions that are unobserved. It may also exclude other recent developments in the fintech industry after the year 2022. Overall, the absence of robustness to heteroskedasticity using the Hausman test in the model and the multicollinearity of some of the variables include lnGEE and lnRQ call for different specifications of the model or additional testing in future studies.

However, the focus on macro-level findings does not take into account micro-level actions and behaviors, and it does not focus on budgetary decisions as well that are important to grasp the economic illiteracy. This could mean that while the average data is beneficial, there is variation depending on income-level, education, and the usage of the digital financial sector. Therefore, the conclusions of this study would not demonstrate the detailed usage of products and services and more research at the micro level, for example, household or cross-sectional data, transactions, should be used to explain the decision-making process regarding the levels of financial literacy and usage of fintech.

Also, the study fails to consider coordination and implementation of psychological and sociocultural factors that affect the decision making in financial literacy, which may compound the understanding of the measures of financial literacy. ECR, financial related cognitive bias, the level of trust that people put in financial institutions and digital divide related factors are all important factors that are missing out in the current model. There is a suggestion that incorporating behavioral finance theories and the type of qualitative assessment utilized in this study in future research might be helpful. Moreover, the fields of machine learning and big data analytics can provide a way for the enhancement of the measurement of financial literacy and handling the sources of measurement bias due to omission variables or other confounding factors.

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