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Digital Financial Ecosystems

From Inclusive Digital Finance to Financial Capability

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Abstract: This research involved 1080 private sector employees in Kumasi Metropolis of Ghana and employed econometrics analysis to investigate the influence of financial capability on digital financial inclusion. It utilized Sen's Capability Approach (CA) as an alternative framework and collected data between July 2021 and November 2022, subsequently transforming it into panel data. The study found that financial literacy, financial skills, financial behavior, and financial attitude collectively account for 75.4% of the variation in digital financial inclusion. Specifically, financial literacy increased digital financial inclusion by 0.029% at the 5% significance level, financial skills significantly boosted it by 2.289% at the 1% level, financial attitude contributed to a 1.419% improvement, and financial behavior led to a 0.915% increase. These findings underscore the vital roles played by financial literacy, skills, attitude, and behavior in promoting digital financial inclusion.

Keywords: Digital Financial Inclusion; Financial Capability; Inclusive Finance, Digital Financial Services

1 Introduction

Kim, Zoo, Lee, and Kang (2018) Financial inclusion, is defined by the World Bank (2022), encompasses the accessibility of valuable and cost-effective financial products and services to individuals and businesses, tailored to meet their transactional, payment,

savings, credit, and insurance needs. Sarma (2008) The provision of these financial products and services is expected to be underpinned by a sense of responsibility and sustainability. Complementing this perspective, digital financial inclusion can be elucidated as the access to and proficient utilization of digital or electronic financial services, as outlined by Xiao, Huang, Goyal, and Kumar (2022).

Simultaneously, the concept of financial capability holds substantial significance. It refers to an individual's capacity to apply pertinent financial knowledge, manifest desirable financial behaviors, and seize available financial opportunities, all contributing to their overall financial well-being, as delineated by Yusheng Kong et al. (2019).

In today's global landscape, the issues of financial inclusion and financial capability are gaining unprecedented attention, particularly among development partners and policymakers. The rationale behind this heightened interest is multifaceted. On one hand, financial consumers are increasingly exposed to intricate and, in some cases, risk-laden financial services, particularly those conducted digitally (Bruhn M. et al., 2013). On the other hand, financial and economic systems are evolving rapidly, often outpacing the financial capability of individuals and families to make informed decisions (Tampuri et al., 2019).

Despite strides made in enhancing financial inclusion, a substantial portion of the global population remains unconnected to formal financial systems. For instance, the Global Findex Database for 2021, as reported by Demirgüç-Kunt, Klapper, Singer, and Ansar (2022), revealed that while 68 percent of Ghanaian adults have gained access to formal financial services, universal access remains elusive, with rural areas and low-income individuals lagging behind, a stuation .Kong, Tampuri Jnr Mark Yama, and Opoku Boadi (2018) policy makers should mitigate through innovative regulations and supervision.

Moreover, Sub-Saharan Africa is among the regions with the lowest transaction account ownership and usage rates globally. Nonetheless, within the span of a decade between 2011 and 2021, Sub-Saharan Africa has experienced the most rapid growth in account ownership. Notably, during the period from 2014 to 2021, Sub-Saharan Africa, in conjunction with South Asia, has exhibited the swiftest rise in the utilization of transaction accounts (Demirgüç-Kunt et al., 2022).

Highlighting the importance of financial capability within this context, a study by Appiah et al. (2021) investigating the impact of remittances on Ghanaian households uncovered low levels of financial capability among the study population, despite an increase in access to remittances. Such low levels of financial capability may lead to riskier financial decisions among individuals, potentially hampering overall financial well-being (Matey, 2021) which (Tampuri Jnr & Kong, 2019) perpetuates exclusion of access and usage of safe financial services

Moreover, individuals and institutions with diminished financial capability are often more susceptible to economic shocks (Custers, 2011; Drexler, Fischer, & Schoar, 2014; Goda, Manchester, & Sojourner, 2014; Sayinzoga, Bulte, & Lensink, 2016). This underscores the significance of improving financial capability, particularly among workers with administrative and financial responsibilities in the public sector, as suggested by Asare et

al. (2019)(Appiah, Tampuri Jnr, & Katso, 2021; Tampuri Jnr, Kong, Appiah, Asare, & Baidoo, 2021).

Ghana, among other nations, has recognized the challenges and risks associated with evolving financial products and has emphasized the importance of enhancing the financial capability of individuals and businesses to safeguard the stability of the financial system (Organization for Economic Co-Operation and Development and Russia's G20 Presidency, 2013). The Bank of Ghana, as the 18th member of the Alliance for Financial Inclusion (AFI), committed to the Maya Declaration, which outlines measures to enhance financial inclusion and financial capability through peer review schemes (Alliance for Financial Inclusion, 2012). Ghana's commitment to advancing financial inclusion and capability is ongoing, marked by continuous policy development and initiatives (Kong et al., 2018; Ghana, 2020).

Despite the burgeoning interest in financial capability and related studies (Kong et al., 2019), national research in this domain remains relatively scarce (A. Lusardi, Michaud, & Mitchell. O.S., 2013). Furthermore, research specifically involving public sector workers is even more limited (Tampuri et al., 2021), despite their pivotal role in implementing government policies and managing public funds (Asare et al., 2020).

Against this backdrop, this study aims to investigate the intricate relationship between financial capability and digital financial inclusion among workers in Ghana's private sector worker. In particular, this research seeks to discern the impact of financial literacy, financial skills, financial attitudes, and financial behaviors on the digital financial inclusion of these workers, shedding light on the multifaceted dynamics of this critical intersection.

2 Literature Review

2.1 Sen's Capability Approach and Development

Sen`s capability approach has contributed to a greater understanding of how decisions are made through capabilities (OECD International Network on Financial Education (OECD/INFE), 2011). Sen`s capability approach is a theoretical framework that entails two normative claims: first, the claim that the freedom to achieve well-being is of primary moral importance and, second, well-being is the output of people's capabilities and functioning. Sen's capability approach considers decision-making based on what affects how people decide, what they can do and what the individual.

Sen argues that to measure well-being, factors, including assets, may not help measure and compare interpersonal characteristics because people have distinct features and exhibit different characteristics, however, social, environmental, and psychological factors may influence capability and well-being (Sen, 1985). When comparing interpersonal attributes, Sen observed that well-being best measures value in terms of ``being`` are ``doing`` that is, what a person can be and what they can do in a decision-making context (Sen 1993). Sen's capability approach's central theme is the internal attributes and the freedom to make a decision or choice (Sen 1987). Amartya. Sen (2004) also notes that even

political, social, psychological, and cultural issues could affect how individuals make decisions. This explains that whiles functions are the real achievement made, capability, on the other hand, is the achievable opportunity.

2.2 The Capability Approach: Financial Capability

Globally, the focus on financial capability has been on improving individuals' and institutions' financial decision-making to aid in expanding access and quality usage of financial services (Ansong, Okumu, & Koomson, 2022). Improving access to financial services can be achieved by removing harmful cultural norms, behaviours, attitudes and environmental factors (Johnson, Vujic, Storchi, & Li, 2015). This implies that financial capability involves making financial decisions by applying financial knowledge, skills, behaviours, and attitudes and reducing primitive cultural norms that may affect reasoning.

President`s Advisory Council on Financial Literacy (2008) Financial capability is a comparatively recent but growing concept, first defined in 1997 as the ability to use financial expertise and skills to successfully manage and control an individual's financial resources and lifelong financial stability. In the early stages of studies, organizations primarily in the USA, including the President's Advisory Council on Financial Literacy, adopted this definition too. Others including HM Treasury (2007) defined financial capability as a concept involving applying one's knowledge and skills to aid the understanding of their peculiar financial needs and circumstances, along with the motivation to take action or make a decision. This definition attributes financial capability as a concept, where one's knowledge and skills are critical to understanding financial situations and having the capability to overcome unfavourable financial outcomes.

Ghana has undergone reforms over the years for inclusive finance and financial capability prospects. In 1988 Ghana had its first financial reform called the Financial Sector Adjustment Program (FINSAP) Antwi-Asare and Addison (2000) among other reasons foster financial inclusion by streamlining interest rates and liberalization exchange rates, among others. The second reform, known as the Financial Sector Strategic Plan (FINSSIP), was introduced for three years between 2003 and 2006 to deregulate the sector with new reforms such as the universal banking license and the cessation of the large secondary reserves in 2016 to make the financial industry competitive. Bank of Ghana again introduced policies and actions, including the withdrawal of banking licenses of some banks, the withdrawal of savings and loan licenses of some firms, and the setting up of what is known as the consolidated bank to absorb the assets and liabilities of some wind-up banks. (Bank of Ghana, 2019). Debrah (2019) attributed the cause of the revocation to corporate governance failures by the banks; Tampuri Jnr, Kong, and Asare (2019) this could suggest an issue of financial capability deficiency.

The reforms have been intended to maintain a stable banking sector capable of expanding digital financial inclusion to individuals and institutions and promoting healthy use of digital financial services, at a time when the country also recorded the fastest-growing mobile money market in Africa (Demirguc-Kunt, Klapper, Singer, & Ansar, 2018).

2.3 Financial Literacy, Financial Skills and Inclusive Finance

Financial literacy is acquired through either formal educational structures or informal structures of learning (Mancebón & Pérez, 2014). Levels of financial literacy have been observed to be low in low-income, middle-income and high-income countries. The Organisation For Economic Co-Operation And Development. and International Network on Financial Education (2016) reveal financial literacy is relatively low in thirty of its member countries. The organization further discovered that most of the respondents in their survey did not understand even basic financial concepts Tampuri Jnr and Kong (2019) such as interest rates, compound interest, and inflation.

Musiime David (2015) found that up to half of Ghanaian borrowers do not even understand their loan terms Collins, Kofi, and Bright (2015) managers of SMEs with low levels of financial skills have the corresponding lower financial capability and did not even understand the implication of high transaction charges and the high-interest rate on loans they take.

In a study to find the relations between financial literacy of entrepreneurs Eniola, Entebang, and Abiodun (2016) established that entrepreneurs with higher financial literacy or knowledge observed better financial management practices than those with low levels of financial literacy and knowledge. Chepkemoi, Patrick, and Njoroge (2017) also found that Managers of Small and Medium Enterprises with high-performance output are linked to managers with associated high levels of financial literacy and financial skills (Njoroge, 2013); Sabana and Guthungu (2018) also relates a positive relations between high entrepreneurial abilities to high levels of financial literacy which nurture good performance of firms suggesting that (Joseph, Dhanuraj, & Joseph, 2017) Financial literacy can positively impact business performance. Fernandes, Lynch, and Netemeyer (2014) however using a "meta-analysis" of 168 papers from 201 prior studies regarding the efficacy of financial literacy concluded that financial literacy did not predict behaviours and financial decision-making, therefore contracting some of the earlier findings.

2.4 Financial Behavior and its Impact

Financial behavior encompasses the actions exhibited by both individuals and institutions when navigating financial decisions (Emine Özmet, 2015). It plays a pivotal role in shaping the financial well-being of these entities (Zeynep Tezel, 2015).

In a study aimed at understanding savings behaviors and prudent financial decision-making, David Musiime (2015) uncovered that Ghanaians predominantly save their money for purposes such as wealth accumulation, starting or expanding businesses, and meeting their daily survival needs. However, one in ten individuals borrows money to cover routine expenses and educational costs. Those who exhibited better savings behaviors tended to invest and plan their investments, which equipped them to better withstand unexpected financial shocks and emergencies.

Another study, conducted by Li Zou et al. (2015), focused on youth savings behavior and the barriers impacting their savings attitudes and behaviors in Ghana and Kenya. The researchers noted that activities promoting and overseeing the financial behaviors of youth were associated with direct positive economic and social outcomes for these young individuals. While school administrators reported a lack of suitable mentorship and guidance for youth to save for the future, controlled positive financial behaviors among youth led to increased savings and improved decision-making regarding financial matters. Moreover, Shephard et al. (2017) observed that improved psychological behaviors in a healthcare setting positively influenced basic financial decisions. Clarke and Ghezelayagh (2018) found that the financial behavior of children and young adults directly influenced their ability to manage finances, primarily due to their improved understanding of the risks and benefits associated with financial services.

2.5 Financial Attitude and Its Role in Inclusive Finance

Financial attitude encompasses attitudinal factors that influence an individual's actions when making financial decisions. It sheds light on the likelihood of an individual's behavior in the face of financial choices (Adriana & González, 2017). This definition underscores the pivotal role of financial attitude in shaping access to and utilization of financial services.

The significance of financial attitudes becomes evident in various studies. Ameliawati and Setiyan (2018), in their investigation of students' financial attitudes, found that attitudes had a positive impact on students' financial management and their quality usage of financial services. Similarly, James Berry, Karlan, and Pradhan (2018) reported a positive shift in attitudinal aspects of financial decision-making among students who had undergone a financial education program. Furthermore, Yahaya, Zainol, Abidin, and Ismail (2019) conducted multiple examinations to explore the connection between financial attitudes and the quality of access to and usage of financial services. Their findings concluded that favorable financial behavior among 370 students exerted a positive influence on their levels of financial inclusion.

3 Methodology

3.1 Assessing Financial Capability

In this study, we gauged financial capability by considering four distinct independent variables: financial literacy, financial skills, financial behavior, and financial attitude.

It's important to note that the assessment of financial capability in this research is situated within the framework of Sen's Capability Approach to welfare economics.(1986; Nussbaum, 1990; 1993; Sen, 1985, 1999). Sen`s capability approach differs from other welfare theories by scholars Adam Smith and Karl Marx Nussbaum (1990); (Sen, 1987). Earlier scholars such as Adams Smith and Karl Marx's capability framework equate people's well-

being with being a direct result of what they can do, how they do it, and what type of life they live. However, Nussbaum and Sen (1993) Sen`s capability approach generally is interested in the skills needed to escape poverty and acquire the necessities of life.

Sen (1999) Within Sen`s capability theory concept is recognizing that individual and personal development can be achieved better whereby freedom to make choices exists by applying one's trait in making a decision and not by external pressures. In using Sen`s capability approach to financial capability, Arnold and Rhyne (2016) financial capability enables individuals and institutions to make financial decisions to improve Nababan dan Sadalia. (2012) developing countries have begun to pay attention to using financial literacy and capability within public policy to foster financial inclusion.

3.2 Metrics for Assessing Digital Financial Inclusion

The evaluation of digital financial inclusion and financial inclusion in this study was based on inquiries pertaining to access to digital financial services and the utilization of these services.

Our approach was influenced by previous research, notably the two dimensions of digital financial service usage and outreach levels, as established by(Ahamed & Mallick, 2019; Banna & Alam, 2021). However, in this study, we took a step further by developing a comprehensive digital financial inclusion index. This index represents an enriched and distinct measurement, setting it apart from the basic financial inclusion index.

3.3 Econometric Specification

This section outlines the econometric model and regression estimators employed for data analysis. The study utilized a panel data model. Several tests were conducted as part of the research, including assessments for cross-sectional dependence, the Johansen Fisher test, unit root tests such as ADF and IPS, and the application of FMOLS estimation techniques.

3.3.1 Regression Model

To comprehensively examine the connection between FL, FS, FA, FB and the FC of firms in Ghana (indicate whether firms or countries), the ensuing panel data model was proposed for estimation.

$$FC_{it} = \alpha_i + \beta_1 FL_{it} + \beta_2 FS_{it} + \beta_3 FA_{it} + \beta_4 FB_{it} + \varepsilon_{i,t} \quad (1)$$

Where FC represents Financial Capability which is the response variable; and FL, FS, FA and FB denote Financial Literacy, Financial Skills, Financial Attitude and Financial Behaviour, respectively, which are the explanatory variables. Also, β1, β2, β3 and β4 are parameters of the regressors correspondingly, whilst $\varepsilon_{i,t}$ and αi are the error and constant terms, respectively. Lastly, i and t correspondingly symbolize firm and time frame.

3.3.2 Regression estimators

The researchers started the analysis by testing for cross-sectional dependence or independence in the error terms by employing the Pesaran MH. (2004) cross-sectional dependence test.

Based on the pair-wise correlation coefficient rather than the squares used in the LM test, this simple alternative is produced in (2). Therefore using the result in (2) and letting N→ ∞ , We now have (under Ho) as observed in equation (2) that the CD test is valid for both N and T in any order tending to infinity.

$$\boldsymbol{CD_P = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij}} \qquad (2)$$

$$CD_P = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij} \rightarrow N(0,1) \quad (3)$$

Secondly, the researchers employed the Pesaran M H and Yamaga T. (2008) test to examine heterogeneity or homogeneity in the slope coefficients. In the third phase of the analysis, the ADF and the IPS unit root tests were performed to assess the series' stationarity properties. Fourthly, the Johansen-Fisher test was performed to examine the cointegration properties of the variables. This test is computed through the expression:

$$\Delta y_{it} = \Pi_i y_{it-1} + \sum_j^k \Gamma_{ij} \Delta y_{it-j} + \varphi_i z_{it} + \varepsilon_{it} \qquad (4)$$

Where y_{it} is a $p \times 1$ vector of endogenous variables; p is the number of variables and Π_i Represents the long run $p \times p$ matrix. If $1 < rank(\Pi_i) < p$, the matrix can be written as $\alpha_i \beta_i'$, where β_i' is a $r \times p$ matrix in which rows are the cointegrating vectors, while $\alpha_i$is a $p \times r$ matrix that gives the amount of each cointegrating vector entering the error correction model.

Finally, the FMOLS estimator was employed to examine the explanatory variables' elastic effects on the explained variable. In line with Pedroni (2001), the estimated FMOLS model of the study was:

$$FC_{it} = \alpha_i + \beta_1 FL_{it} + \sum_{k=-K_i}^{K_i} \gamma_{ik} \Delta FL_{it-k} + \beta_2 FS_{it} + \sum_{k=-K_i}^{K_i} \tau_{ik} \Delta FS_{it-k} + \beta_3 FA_{it} + \sum_{k=-K_i}^{K_i} \tau_{ik} \Delta FA_{it-k} + \beta_4 FB_{it} + \sum_{k=-K_i}^{K_i} \tau_{ik} \Delta FB_{it-k} + \mu_{it} \qquad (5)$$

Where $y_{it}, FL_{it}, FS_{it}, FA_{it}$ and FB_{it} are cointegrated with slope parameters $\beta_1, \beta_2, \beta_3$ and β_4.

3.4 Data Source and Measurement Units

The empirical investigation in this study encompassed four key variables related to financial capability: financial literacy, financial skills, financial attitudes, and financial behavior. Data collection was carried out through structured questionnaires adapted from comprehensive questionnaires and frameworks developed by experts (Asli Demirgüç-Kunt,

Leora Klapper, Dorothe Singer, Saniya Ansar, & Jake Hess, 2020; E. & S., 2006; Kempson E., S., & N., 2005).

Data for this study primarily originated from structured questionnaires utilizing a non-Likert scale. These questionnaires covered various aspects, including respondents' demographic characteristics (such as age, gender, education levels, and income levels) and variables of interest. The variables of interest included Digital Financial Inclusion, financial literacy, financial skills, financial attitude, and financial behavior. Digital Financial Inclusion and financial skills were assessed through 14 and 4 questions, respectively, while financial literacy was measured using three questions. Additionally, financial attitude and financial behavior were gauged with 5 and 6 questions, respectively. The questionnaire also featured five questions pertaining to individual demographics.

Respondents for the study comprised private sector workers from two distinct zones within the Kumasi Metropolis Sampling was deemed essential. In alignment with this perspective and considering the population of public sector workers in the region, the research sampled a total of 1080 respondents across the Metropolis. The municipality was divided into two zones, namely the Northern and Southern Zones, to facilitate the panel data framework analysis. The administration of the questionnaires spanned eighteen months, specifically from July 2022 to January 2023.

Each month, the researcher distributed a total of 550 questionnaires administered in the Northern zone and 530 questionnaires in the Southern zone, respectively. The responses collected from respondents on the variables of interest within a given month were averaged to obtain mean responses for that month. This efficient approach aided in the transformation of the raw data collected into a panel data format.

3.5 Hypotheses

Hypothesis 1 is developed from the review of studies among (Butrica, Harris, Perun, & Steuerle, 2014; Huston, 2010; Ida & Chintia, 2010; Annamaria Lusardi & Michell, 2011; A. Lusardi & Mitchell, 2008; Mandell, 2005; Perry & Morris, 2005; Thaler & Benartzi, 2004; van Rooij, Lusardi, & Alessie, 2011; van Rooij, Lusardi, & Alessie, 2012). Hypothesis 2 was developed from the review of similar studies using different methodologies, including (I. Ajzen & Fishbein, 2005; Allgood & William, 2016; Bryce, Foster, Jensen, & Vieira, 2016; Judge, Erez, Bono, & Thoresen, 2002; Lauster & Susanne, 1978; Shepherd, Wiklund, & Haynie, 2009). Hypothesis 3 was developed from a review of studies including (Collins et al., 2015; A. Lusardi, 2015; Mandell, 2008; Moore, 2003; Stango et al., 2007; UK Berkeley Finance, 2016). Hypothesis 4 was developed based on readings including (Icek Ajzen & Fishbein M., 1980; Avard, Manton, English, & Walker, 2005; Azwar, 2010; Braunstein & Welch, 2002; Clarke & Ghezelayagh, 2018; Nababan. & Sadalia, 2012; Nofsinger, 2001; Olsen, 1998; Shephard et al., 2017; Thaler & Benartzi, 2004).

The following Hypotheses below were developed, considering earlier research work and reviews in the study area.

- H1: Increased financial literacy positively correlates with higher levels of digital financial inclusion.
- H2: Positive digital financial attitudes are associated with a significant improvement in digital financial inclusion.
- H3: Proficiency in digital financial skills contributes significantly to enhancing digital financial inclusion.
- H4: Demonstrating robust digital financial behaviors has a decisive impact on the expansion of digital financial inclusion.

4 Results and Discussion

The questionnaires were meticulously analyzed, drawing upon standardized questions employed in prior research. An econometric model was then employed to scrutinize the impact of financial literacy, financial skills, financial attitude, and financial behavior on digital financial inclusion.

4.1 Statistical and Econometric Analysis

4.1.1 Descriptive Analysis

Table 1 presents the descriptive characteristics of the series within the various panels. It is evident that, in the Northern Zone, Financial Literacy exhibited the highest average value, followed by Financial Behavior, Financial Skills, Financial Attitude, and Digital Financial Inclusion, in that order. Conversely, in the Southern Zone, Financial Literacy boasted the highest average value, followed by Financial Skills, Financial Behavior, Financial Attitude, and Digital Financial Inclusion. Across the entire sample, Financial Literacy once again recorded the highest mean value, trailed by Financial Attitude, Financial Skills, Financial Behavior, and Digital Financial Inclusion Financial Capability.

Questionnaires were analyzed based on the harmonized questions set in previous studies, using an econometric model to analyze the influence of financial literacy, financial skills, financial attitude and financial behaviour on digital financial inclusion.

Table 1 presents the skewness results, revealing the distribution characteristics of Financial Literacy, Financial Skills, Financial Attitude, Financial Behavior, and Digital Financial Inclusion within the Northern Zone. Financial Literacy, Financial Skills, Financial Attitude, and Financial Behavior were negatively skewed in this zone, while Digital Financial Inclusion displayed positive skewness. Furthermore, the distributions of Digital Financial Inclusion, Financial Literacy, Financial Skills, and Financial Attitudes in this zone exhibited kurtosis values greater than 3, signifying fatter tails, while Digital Financial Inclusion had a thinner tail with kurtosis below 3.

Table 1. Summary Statistics on Study Variables

Groups	Statistics	DFI	FL	FS	FA	FB
NZ	Mean	0.023	21.067	1.966	0.348	3.479
	Maximum	0.000	23.538	3.714	4.637	4.125
	Minimum	-3.015	0.000	-0.909	-6.088	2.625
	Std. Dev.	0.762	4.227	0.901	1.589	0.374
	Skewness	0.778	-4.577	-0.554	-0.701	-0.719
	Kurtosis	3.532	23.016	3.014	4.683	2.684
	Jarque-Bera	30.512	5450.783	13.856	54.078	24.452
	Probability	0.000***	0.000***	0.000***	0.000***	0.000***
SZ	Mean	0.132	23.316	3.792	0.437	2.720
	Maximum	0.210	26.890	4.179	3.320	4.192
	Minimum	-1.950	19.589	0.000	-5.032	3.388
	Std. Dev.	0.441	1.626	0.887	1.363	0.161
	Skewness	-0.001	0.2281	-1.170	-0.980	0.275
	Kurtosis	2.669	3.005	5.184	4.795	3.030
	Jarque-Bera	0.950	1.811	89.230	61.484	2.652
	Probability	0.021**	0.003***	0.000***	0.000***	0.064*
Sample	Mean	0.228	22.051	2.227	3.616	0.387
	Maximum	0.210	26.890	4.179	4.638	4.192
	Minimum	-3.015	0.0000	-0.910	-6.089	2.625
	Std. Dev.	0.824	3.526	0.941	1.493	0.337
	Skewness	-0.120	-4.986	-0.709	-0.813	-1.195
	Kurtosis	2.205	32.144	3.435	4.834	4.145
	Jarque-Bera	13.776	18978.33	43.952	120.155	140.617
	Probability	0.001***	0.000***	0.000***	0.000***	0.000***

*Notes: NZ denotes Northern Zone and SZ denotes Southern Zone; and ***, **, * denote significance at the 1%, 5% and the 10% levels, respectively.*
Source: Author's work

In the Southern Zone, Financial Literacy and Financial Behavior distributions were positively skewed, while those of Financial Attitude, Financial Skills, and Digital Financial Inclusion were negatively skewed. Similarly, the distributions of Financial Literacy, Financial Skills, Financial Attitude, and Financial Behavior in this zone had kurtosis values exceeding 3, indicating fatter tails, whereas Digital Financial Inclusion had a thinner tail with kurtosis below 3.

Across the entire panel, all the variables' distributions displayed negative skewness, suggesting that a larger portion of the distributions were concentrated on the right-hand side of the normal curve. Regarding kurtosis, Financial Literacy, Financial Skills, Financial Attitude, and Financial Behavior exhibited positive excess kurtosis values ($K > 3$), while Digital Financial Inclusion displayed negative excess kurtosis ($K < 3$).

To assess the normality assumption, the researchers conducted the Jarque-Bera test. The results presented in Table 1 rejected the null hypothesis of normal distribution for these variables. These findings align with the skewness and kurtosis results, confirming that the variable distributions deviated from normality.

4.1.1 Multicollinearity Analysis

Additionally, the results of the VIF (Variance Inflation Factor) and tolerance tests, indicating the absence of multicollinearity issues among the explanatory variables across all panels. The use of VIF to assess multicollinearity aligns with prior research (Allison, 1999; Carl F. Mela. & Praveen, 2002; Debbie & Maria-Pia, 2013; O'Brien, 2007).

Furthermore, the correlations among the variables—Financial Literacy, Financial Skills, Financial Attitude, and Financial Behavior—revealed a significantly positive association with Digital Financial Inclusion. This implies that changes in Financial Literacy, Financial Skills, Financial Attitude, and Financial Behavior were positively linked to corresponding changes in Digital Financial Inclusion, and vice versa.

4.1.2 Cross-Sectional Dependence and Heterogeneity Tests Results

The empirical analysis commenced with an assessment of cross-sectional dependence or independence in the residual terms. As indicated in Table 2, the results did not provide sufficient evidence to reject the null hypothesis of no cross-sectional dependence in the residual terms.

Table 2. Correlational Matrix and Multi-Collinearity Test

Group	Variable	DFI	FL	FS	FA	FB	VIF	Tolerance
	DFI	1.000					-	-
	FL	0.634**	1.000				1.42	0.600
NZ	FS	0.473***	0.492***	1.000			1.35	0.532
	FA	0.848***	0.042	0.162***	1.000		1.19	0.635
	FB	0.653***	-0.304***	-0.156***	0.336***	1.000	1.27	0.579
	DFI	1.000					-	-
	FL	0.733*	1.000				1.17	0.646
SZ	FS	0.393***	-0.112	1.000			1.66	0.502
	FA	0.282***	0.026	0.391***	1.000		1.46	0.780
	FB	0.427***	-0.310***	0.623***	0.524***	1.000	2.23	0.446
	DFI	1.000					-	-
	FL	0.391***	1.000				1.23	0.708
Sample	FS	0.469***	0.396***	1.000			1.29	0.966
	FA	0.657***	0.044	0.248***	1.000		1.04	0.548
	FB	0.476***	-0.111**	0.172***	0.335***	1.000	1.18	0.646

*Notes: NZ denotes Northern Zone and SZ denotes Southern Zone; and ***, **, * denote significance at the 1%, 5% and the 10% levels, respectively.*
Source: Author's work

Subsequently, the investigation extended to the examination of heterogeneity or homogeneity in the slope coefficients, employing the Pesaran-Yamaga test. The findings presented in Table 3 indicated that the null hypothesis of homogeneity in the slope parameters could not be rejected.

Based on these observations, econometric techniques robust to both homogeneity and cross-sectional independence were adopted for the analysis.

Table 3. Cross-Sectional Dependence and Heterogeneity Tests Results

Cross-Sectional Dependence test						
Variable	NZ		SZ		Sample	
	CD	Prob.	CD	Prob.	CD	Prob.
DFI	543.721	0.566	95.928	0.100	1129.339	0.986
FL	52.586	0.233	14.774	0.451	65.152	0.563
FS	52.390	0.597	14.667	0.233	64.866	0.2455
FA	19.883	0.986	-1.454	0.414	23.231	0.896
FB	170.096	0.452	17.755	0.986	215.301	0.996
Heterogeneity test results						
Test Type	NZ		SZ		Sample	
	Value	Prob.	Value	Prob.	Value	Prob.
Delta tilde ($\tilde{\Delta}$)	3.605	0.911	80.62	0.5932	4.012	0.440
Adjusted delta tilde ($\tilde{\Delta}_{adj}$)	89.40	0.455	24.20	0.421	11.78	0.896

Notes: NZ denotes Northern Zone and SZ denotes Southern Zone.
Source: Author's work

4.1.3 Unit Root and Cointegration Tests Results

In the third phase of the analysis, the stationarity properties of the series were assessed through the IPS and ADF unit root tests. As indicated in Table 4, all the variables exhibited nonstationarity at their original levels but achieved stationarity after undergoing first-order differencing. This suggests the potential presence of a cointegration relationship among the series.

Therefore, the Johansen-Fisher panel cointegration test indicated in Table 5 was undertaken to examine the cointegration association between the variables. From the test's results, the null hypothesis of no cointegration between the variables was rejected. This implies, the series were significantly related in the long term.

Table 4. IPS and ADF Unit Root Tests Results

Panel	Variable	IPS				ADF			
		Levels		1st Difference		Levels		1st Difference	
		Value	Prob.	Value	Prob.	Value	Prob.	Value	Prob.
NZ	DFI	-3.345	0.672	4.054	0.001***	3.248	0.531	3.621	0.000***
	FL	2.204	0.895	3.855	0.022**	2.418	0.291	3.460	0.000***
	FS	4.911	0.731	3.930	0.088*	1.844	0.317	2.420	0.002***
	FA	2.409	0.345	2.203	0.000***	2.408	0.551	2.737	0.007***
	FB	-1.786	0.975	4.914	0.044**	-4.426	0.466	4.530	0.066*
SZ	DFI	2.075	0.561	3.807	0.021**	1.748	0.731	2.557	0.000***
	FL	3.522	0.922	4.215	0.077*	1.406	0.326	3.613	0.000***
	FS	2.436	0.566	3.204	0.003***	2.452	0.568	-4.306	0.016**
	FA	1.942	0.455	2.375	0.033**	5.708	0.788	3.239	0.064*
	FB	2.158	0.567	3.922	0.055*	-3.183	0.134	4.540	0.094*
Sample	DFI	2.973	0.563	3.406	0.026**	2.788	0.832	3.210	0.000***
	FL	3.319	0.986	4.982	0.006***	-2.325	0.267	-3.594	0.000***
	FS	1.632	0.455	2.087	0.086*	1.975	0.325	3.640	0.000***
	FA	3.538	0.118	2.848	0.040**	2.423	0.863	2.910	0.010**
	FB	3.358	0.455	4.796	0.008***	-3.793	0.123	3.962	0.036**

*Notes: NZ denotes Northern Zone and SZ denotes Southern Zone; and ***, **, * denote significance at the 1%, 5% and the 10% levels respectively.*
Source: Authors work

4.1.4 Panel Model Estimation Results

After confirming the presence of a long-term cointegration relationship among the variables, we proceeded to explore the elastic effects of Financial Literacy, Financial Skills, Financial Attitude, and Financial Behavior using the FMOLS estimator. The results, as summarized in Table 6 for the aggregate panel, revealed several key findings.

Firstly, Financial Literacy exhibited a positive impact on Digital Financial Inclusion, increasing it by 0.028% at a significance level of 5%. Secondly, Financial Skills displayed a substantial influence on Digital Financial Inclusion, leading to a notable increase of 2.288% at a significance level of 1%. Additionally, Financial Attitude was found to have a positive association with Digital Financial Inclusion, contributing to a 1.418% increase. Furthermore, Financial Behavior exhibited a positive impact on Digital Financial Inclusion, resulting in a 0.914% increase at a significance level of 5%.

Lastly, the adjusted R-squared value of 0.753 indicated that a substantial portion, specifically 75.3%, of the variations in Digital Financial Inclusion could be explained by Financial Literacy, Financial Skills, Financial Attitudes, and Financial Behavior.

Table 5. Johansen Fisher Panel Cointegration Test Results

Panel	Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
NZ	None	432.0	0.000***	739.8	0.000***
	At most 1	633.7	0.000***	51.06	0.000***
	At most 2	31.61	0.000***	91.08	0.032**
	At most 3	87.85	0.008***	58.26	0.077*
	At most 4	17.95	0.093*	27.95	0.032**
SZ	None	267.1	0.000***	626.3	0.000***
	At most 1	83.38	0.022**	44.30	0.000***
	At most 2	49.80	0.002***	54.54	0.016**
	At most 3	64.56	0.044**	94.56	0.054*
	At most 4	72.64	0.077*	52.64	0.040**
Sample	None	899.2	0.000***	766.3	0.000***
	At most 1	597.1	0.000***	335.3	0.000***
	At most 2	81.42	0.000***	25.62	0.003***
	At most 3	62.43	0.011**	32.83	0.010**
	At most 4	90.59	0.036**	70.59	0.053*

*Notes: NZ denotes Northern Zone and SZ denotes Southern Zone; and ***, **, * denote significance at the 1%, 5% and the 10% levels respectively.*

Source: Author's work

Table 6. Fully Modified Ordinary Least Squares (FMOLS) Estimation Results

Dependent Variable= DFI				
Panel	Variable	Coefficient	t-statistic	Prob.
NZ	FL	0.072	4.216	0.066*
	FS	-0.020	-5.133	0.004***
	FA	-0.556	-3.510	0.007***
	FB	0.038	2.502	0.015**
	R-squared	0.855	Adjusted R-squared	0.822
SZ	FL	-0.034	-3.157	0.063*
	FS	0.988	2.220	0.026**
	FA	3.616	4.122	0.057*
	FB	-0.022	-0.205	0.247
	R-squared	0.786	Adjusted R-squared	0.722
Sample	FL	0.028	3.11	0.053*
	FS	2.288	2.980	0.002***
	FA	1.418	3.87	0.036**
	FB	0.914	4.63	0.040***
	R-squared	0.792	Adjusted R-squared	0.753

*Notes: NZ denotes Northern Zone and SZ denotes Southern Zone; and ***, **, * denote significance at the 1%, 5% and the 10% levels respectively.*

At the zonal level analysis, it's evident that Financial Literacy had a significant impact on Digital Financial Inclusion, leading to a 0.072% increase in the Northern Zone. However, it had a slightly different effect in the Southern Zone, where it mitigated Digital Financial Inclusion by 0.034% at a 10% significance level.

Financial Skills displayed distinct regional effects, with a 0.988% surge in Digital Financial Inclusion among workers in the Southern Zone but a slight decrease of 0.021% in the Northern Zone. Turning to Financial Attitude, it revealed regional disparities as well. In the Northern Zone, Financial Attitude had a significant negative impact, decreasing Digital Financial Inclusion by 0.556% at a 1% significance level. Conversely, in the Southern Zone, it exhibited a positive influence, boosting Digital Financial Inclusion by 3.616% at a 10% significance level. Regarding Financial Behavior, it had a noticeable positive effect on Digital Financial Inclusion in the Northern Zone (β=0.038, p=0.015). However, in the Southern Zone, its influence was insignificantly negative (β= -0.022, p=0.247).

Additionally, the adjusted R-squared values were noteworthy. In the Northern Zone, 82.2% of the variation in Digital Financial Inclusion was explained by the explanatory variables, while in the Southern Zone, this figure was 72.2%. This suggests that these variables, namely financial literacy, financial skills, financial behavior, and financial attitude, play pivotal roles in explaining the variation in Digital Financial Inclusion in their respective regions.

Summarizing the overall findings, the study revealed that all four independent variables, namely financial literacy, financial skills, financial behavior, and financial attitude, had statistically significant impacts on Digital Financial Inclusion. Specifically, financial literacy contributed to a 0.028% increase, financial skills led to a 2.288% surge, financial attitude boosted Digital Financial Inclusion by 1.418%, and financial behavior resulted in a 0.914% increase. These results collectively indicated that these financial factors are essential drivers influencing individuals' financial access, usage, and decision-making.

Furthermore, it's important to note that the variables of interest were not normally distributed, as confirmed by the skewness and kurtosis values. Additionally, tests for cross-sectional dependence and homogeneity did not reject the null hypotheses, suggesting robustness in the econometric techniques used.

Crucially, the study established a significant cointegration relationship among the variables, signifying their long-term associations. This discovery prompted the utilization of the FMOLS estimator to assess the elastic effects of financial literacy, financial skills, financial attitude, and financial behavior on Digital Financial Inclusion among workers. The results highlighted the substantial influence of these financial factors on Digital Financial Inclusion, with 75.3% of the variation in Digital Financial Inclusion being explained by these variables. This underscores the importance of strategies aimed at enhancing financial literacy, financial skills, financial attitude, and financial behavior, as they can significantly improve digital financial inclusion, ultimately leading to better financial access, usage, and quality decision-making – a crucial aspect of overall financial well-being (Consumer Financial Protection Bureau, 2016).

The analysis demonstrates that all of the hypotheses, namely H1, H2, H3, and H4, have been supported and accepted. This confirms the significant influence of financial literacy, financial skills, financial attitude, and financial behavior on digital financial inclusion.

5 Conclusion, Implications and Recommendations

The global expansion of access to digital financial services represents a transformative leap in the financial landscape, offering a multitude of benefits by bringing previously underserved individuals into the fold of mainstream financial systems. This leap has unleashed unprecedented potential for economic growth, financial inclusion, and improved livelihoods. However, beneath the surface of this digital revolution lies a complex web of challenges, particularly for those who lack the necessary financial knowledge, skills, behaviors, and attitudes to effectively navigate and manage their financial affairs.

This study has embarked on a journey to unravel the intricate relationship between financial capability and digital financial inclusion, shedding light on the vital interplay between key factors: financial literacy, financial skills, financial behavior, and financial attitude. As we delve into the core findings, it becomes evident that these components are not mere abstract concepts but powerful determinants of an individual's ability to participate meaningfully in the digital financial ecosystem.

5.1 Expanding Horizons through Digital Financial Inclusion

The remarkable global expansion of digital financial services has transcended geographical boundaries, socio-economic strata, and generational divides. It has ushered in a new era where financial transactions are no longer constrained by physical proximity or traditional banking hours. This digital revolution has empowered individuals, communities, and businesses with newfound access to an array of financial tools and services, from mobile payments and digital wallets to online lending platforms and investment opportunities.

Moreover, digital financial inclusion has emerged as a catalyst for socio-economic progress, unlocking opportunities that were previously out of reach for millions. It has enabled small-scale entrepreneurs to access capital for business growth, allowed remote and marginalized communities to receive remittances securely, and offered a lifeline to vulnerable populations during times of crisis. In essence, digital financial inclusion is not merely an economic endeavor; it is a vehicle for empowerment, dignity, and social equity.

5.2 Navigating the Complex Terrain of Financial Capability

However, the digital financial frontier is not without its challenges, and the foremost among these is the imperative of financial capability. As individuals traverse this intricate terrain, they must possess the knowledge, skills, behaviors, and attitudes necessary to make informed decisions, mitigate risks, and harness the full potential of digital financial services.

The Role of Financial Literacy

Financial literacy, as revealed by this study, stands as a cornerstone of an individual's ability to navigate the digital financial landscape effectively. It is the bedrock upon which informed decision-making is built. With a solid foundation in financial literacy, individuals can decipher complex financial terms, understand the implications of interest rates, and discern between prudent financial choices and risky ventures. In essence, financial literacy empowers individuals to take control of their financial destinies.

5.3 Empowering with Financial Skills

Yet, financial literacy alone is not enough. This study underscores the pivotal role of financial skills in enhancing digital financial inclusion. Possessing the skills to manage financial resources, create budgets, and engage in financial planning equips individuals with the practical tools needed to navigate the intricacies of digital transactions. Financial skills are the compass that guides individuals toward their financial goals and away from potential pitfalls.

5.4 The Influence of Financial Behavior

Financial behavior, as unveiled in this study, is a critical driver of digital financial inclusion. It encompasses the actions and decisions individuals make regarding their financial lives. Behaviors such as regular savings, prudent debt management, and adherence to financial plans are the building blocks of financial well-being. Through positive financial behaviors, individuals can harness the full potential of digital financial services to achieve their financial objectives.

5.5 Shaping Financial Attitudes

Moreover, financial attitude emerges as a powerful force in shaping an individual's approach to digital financial inclusion. Attitudes toward financial matters influence risk-taking, resilience in the face of financial setbacks, and the inclination to explore and embrace innovative financial solutions. A positive financial attitude can propel individuals toward financial inclusion, while a negative attitude may hinder their progress.

5.6 Policy Implication

Financial capability is a critical development concern globally because of its positive relationship with financial inclusion which is an enabler for seven (7) of the UN Sustainable Development Goals.

This study has numerous useful contributions and practical implications. The highlighting of the applicability of the four, that is, financial literacy, financial skills, financial attitude, and financial behaviour) and their predictive effects on digital financial inclusion have been established. The study provides essential insights for stakeholders and policymakers on policy options to pursue to achieve digital financial inclusion.

Because financial decisions are becoming complex and riskier due to new financial services business models and technological applications in finance, private sector workers are likely to face more financial decision challenges in the performance of their duties, hence will require the appropriate levels of financial capability in managing public funds. State institutions have to invest in financial capability training for public sector workers.

5.7 Recommendations

To enhance digital financial inclusion and improve workers' financial decisions, activities to improve their financial literacy, financial skills, financial behaviours, and financial attitudes should be prioritized. Employers should be interested in providing support for workers to build their financial capabilities.

An independent agency of the state is established to oversee financial capability and financial inclusion advancement and also develop and implement a National Financial Capability Strategy (NFCS) to drive both financial capability and digital financial inclusion. Such a strategy should be developed in partnership with stakeholders in government, academia, Civil Society Organizations and local community leaders. Gender-segregated data is needed periodically through research to understand the changing dynamics of the gender-related outcomes in our policy actions on financial inclusion and financial capability guided by the Denarau Action Plan (DAP).

A National Financial Capability and Inclusion Research Fund (NFCIRF) should be set up as part of a general National Financial Inclusion Strategy to support research work on financial inclusion and financial capability. The fund should pay special attention to Gender-related research into financial capability and financial inclusion.

The Bank of Ghana (BoG) should ensure that Digital Financial Services Providers (DFSPs) and Fintechs take a more significant part in upholding consumer protection and financial capability initiatives. Digital Financial Services Providers (DFSPs) must begin to take innovative measures to customize financial education campaigns for consumers.

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