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Financial Literacy and Gender Dynamics in Shaping Inclusive Finance

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ABSTRACT

Purpose: The growing concern on financial inclusion around the world, highlighted the focus on financial literacy. The objective of the study is to the understand the difference between the financial knowledge amongst man and woman to examine how this difference impact the use and access of financial services ultimately contributed towards the financial inclusion. This study is to serves the United Nation Sustainable Goals (SDGs) mainly SDG-1, SDG-5, SDG-8, SDG-10 and SDG-17.

Design and Methodology: The study utilizes the quantitative approach with secondary data from sources such as, World bank, Findex survey, UNESCO. Panel data is used to analyze the influence by employing different panel regression techniques such as fixed-random effect model along with other measure of multicollinearity and correlation analysis.

Findings: The results show significant negative relationship between gender gap in financial literacy and financial inclusion. This shows that women have low level of financial literacy as compared to the men makes it difficult for women to participate in financial system and negatively influenced their financial inclusion. Our finding highlights the importance to increase financial literacy among women to enable them effectively use financial services and to take part in financial decision making for betterment of economic empowerment.

Implications: The study finding offers meaningful insights for education sector, financial institution, policy maker and government to develop different kinds of programs to enhance the financial knowledge in women in order to reduce the gender differences. These will also help in achieving Sustainable Development Goals by encouraging the gender equality, reducing inequality and encourage economic growth.

Originality/Value: The study examines the relationship between financial literacy and financial inclusion in context of emerging/ developing countries.

Keywords: Financial Inclusion, Financial Literacy, Gender, SDG, Empowerment, Developing economies

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1. Introduction

In today's digitalized world Financial literacy has emerged as key aspect of economic development, and a driver of promoting financial inclusion, reducing inequality and to support sustainable economic growth (Lusardi & Mitchell, 2011; Pandey et al., 2022). Its refers to the individual ability to understand and adopt the financial concept to make informed decision such as making budget, managing savings, understanding interest rate and to use different financial services in day to day financial affairs (Kozup & Hogarth, 2008; Lusardi & Mitchell, 2014; Remund, 2010). Financially literate individuals can effectively engage with financial institution, responsibly access the credit, plan their long term financial needs, and to protect themselves from exploitation (Huston, 2010; Klapper et al., 2013; Xu & Zia, 2012). Financial inclusion on the other hand, defined as the accessibility, availability and effective use of financial services and its plays a vital role in reducing poverty, social equity, and promotes economic development (Demirguc-Kunt et al., 2018; Demirgüç-Kunt & Klapper, 2013; Mishra et al., 2024; Tay et al., 2022). According to Allen et al. (2016), when the individuals are financially included, they can effectively and actively use financial tools like making digital payments, insurance, credit facilities, investment in entrepreneurship or education to accumulate wealth over time. However, meaningful financial inclusion cannot be achieved without the fundamental financial knowledge to all.

Financial literacy is not only essential for well-being but it's also contribute directly towards achieving United Nations Sustainable Development Goals (UN SDGs) includes SDG 1 (No poverty), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 10 (Reduced Inequalities) and SDG 17 (Partnership for Goals) (United Nations, 2015). It enables peoples to escape from poverty, participate in labor market, invest in education, and build resilient households and communities (Agnew & Szykman, 2005). Regardless of its importance, financial literacy is not equally disseminated, across social cultures and countries, a prominent and consistent gap exist among gender. A number of studies by scholars have presented that the level of financially literacy rate of women is less than that of men's (Bucher-Koenen et al., 2021; Hasler & Lusardi, 2017; Lusardi & Mitchell, 2008). This gap is not only restricting women in accessing the financial services such as access to credit, insurance and saving but also confines their ability to independently make sound financial decision regarding investment, economic choices, and to attain long-term financial security. This gender base gap in financial knowledge become a main concern to address in the initiative toward inclusive and unbiased financial systems.

An increasing body of research over the past decades highlights that how essential financial literacy is when it comes to make smart financial choices (Klapper et al., 2013; Lusardi & Mitchell, 2011, 2014). According to Mandell, (2008), financially literate individuals are more likely to engage in behaviors that raise long term financial security, such as regular savings and wise borrowing. Early studies (such as Rehman et al., 2019) focused on measuring how financial

knowledge impacts behavior, consistently showing that individuals with higher financial knowledge are more likely to plan for their future financial needs effectively (Lusardi & Mitchell, 2008). Over time researcher shifted from cross sectional analyses to more advance methodologies i.e., longitudinal studies, to under the casual relationships (Fernandes et al., 2014). Along with this advancement in academic interest, governments and global organization start heavy investment in financial education programs, especially targeting vulnerable group such as young youth, women and low-income communities.

On the contrary for financial inclusion, significant progress has been done in tracking how people access and use different financial services. The World Bank's Global Findex Report (2017, 2021) have played a major role in highlighting the global trends in bank account ownerships, saving and borrowing habits. The data in reports shows that financial inclusion is continuously increasing around the globe, but the gender gap persist. Women are still less likely than the men to have a bank account, save or borrow from formal financial institution and to use digital financial tools (Demirguc-Kunt et al., 2018). Numerous studies have investigated the reason behind this gap and pointed out several factors that includes sociocultural norms, limited mobility, legal barriers around property ownership for women, and lower level of financial literacy (Driva et al., 2016; Farrell et al., 2016; Hung et al., 2012; Lusardi & Tufano, 2015).

Despite the notable and significant progress in understanding the issue, key gap remains unaddressed which need attention, especially in emerging and developing economies where gender inequality tends to be more severe and financial systems are often less accessible(Grohmann et al., 2018). One of the major limitation is most of the current research is focused on high-income or developed countries, which limits the ability to see how gender gaps in financial literacy reveals across different social, economic and cultural contexts (Espinoza-Delgado & Silber, 2024; Klapper & Lusardi, 2020; Reddy et al., 2024). Additionally, most of the existing studies often analyse gender a standalone variable, lacking an intersectional approach that consider how gender is intersect with factors like education, income, location and race or ethnicity (Bannier & Schwarz, 2018). Another challenge is the unsatisfactory evaluation of financial literacy programs, particularly in terms of their long-term impact on behavior and gender-specific effectiveness. Many financial education initiatives are generic and fail to address the distinct needs, learning preferences, and constraints that women faces(Fernandes et al., 2014). Furthermore, as digital financial services such as mobile money, fintech applications, and online banking become increasingly important, financial literacy must now encompass digital financial skills. However, little is known about how women engage with digital platforms or how digital literacy can help bridge financial inclusion gaps. Lastly, although the UN SDG's advocate for broad economic development, respectively financial literacy policies remain inadequately incorporated into the national SDGs action plans, mainly from a gender perspective.

Bridging this gender-based gap in the financial literacy is not only a theoretical pursuit, it has critical developmental importance. In an emerging and developing economies, women consistently face physical and social barriers that restricts their financial knowledge and engagement. This deficiency of financial literacy among women's constrains their access to borrowing, insurance savings, and entrepreneurial opportunities, thereby reinforcing the succession of dependency and economic segregation (Goyal & Kumar, 2021). This confronts progress toward UN SDGs such as SDG 1 (No Poverty), where financial empowerment is crucial for uplifting households from poverty, and SDG 5 (Gender Equality), which aims equal rights to economic resources and decision-making power. Also, SDG 8 (Decent Work and Economic Growth) and SDG 10 (Reduced Inequalities) stay unfulfilled when women are not capable to take part fully in formal economic and financial systems due to their financial knowledge constraints.

Financial literacy considers as a leading driver for economic growth and social equity. It enriches individual's decision-making abilities, lifts their confidence, and advances flexibility against economic surprises. At an extensive level, it's increases household savings, strengthens family financial comfort, and positively influence their future generations through enhanced education and health outcomes (Chen & Volpe, 2002; Chen & Volpe, 1998). Incredibly, SDG 17 (Partnerships for the Goals) underlines the necessity of collaboration between governments, educators, financial institutions, and international development bodies in order to provide and implement comprehensive and accessible financial literacy programs. By ending the gender gap in financial literacy, societies not only increase women's empowerment but also disclose significant potential for wide-ranging growth, economic stability and sustainable development. Therefore, understanding and addressing this gap is crucial for achieving unbiased progress across the world.

Our study aims to thoroughly inspect the gender gap in the financial literacy and their implications for financial inclusion, with an emphasis on evolving the United Nations Sustainable Development Goals (SDGs), mainly SDG 1 (No Poverty), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 10 (Reduced Inequalities), and SDG 17 (Partnerships for the Goals) (UN, 2015). The central objective is to assess the level of gender-based inequalities in financial literacy across different social, economic and cultural perspectives and to investigate how these discrepancies effect women's access and use of financial services, eventually strengthening cycle of poverty and economic exclusion. Moreover, this study evaluates the effectiveness of prevailing financial literacy programs targeted at women, classifying best practices and gaps in execution. Identifying the increasing role of digital financial services. It also inspects in what way digital financial education platforms can bridge these gender discrepancies and improve financial inclusion. A key outcome of this research is to formulate evidence-based policy recommendations that integrate gender-responsive financial literacy initiatives into national and global development strategies. By fostering inclusive financial systems, strengthening economic opportunities for women, and promoting multi-stakeholder partnerships, this study aims to

contribute to the achievement of the SDGs, ensuring that financial literacy serves as a catalyst for reducing poverty, empowering women, promoting equitable economic growth, and building stronger global collaborations.

This study broadly investigates the gender gap in financial literacy and its consequent impact on financial inclusion in emerging and developing economies, highlighting the necessity of gender-sensitive financial literacy initiatives. Later sections of the paper will present an extensive literature review, methodological framework, empirical findings, and practical recommendations, advancing critical discourse on financial literacy, gender equality, and sustainable development.

2. Literature Review

Financial inclusion has gained importance globally as a crucial path in achieving the United Nation Sustainable Development Goals (SDG's), predominantly SDG 1 (No Poverty), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 10 (Reduce Inequalities), SDG 17 (Partnership for the Goals) (UN, 2015). Financial inclusion is defined as the access and usage of financial products and services, and to promote inclusive economic growth (Demirguc-Kunt et al., 2018). Within this Sustainable Development Goals Agenda, financial literacy emerges as a key player in enabling individuals to equip with skills and knowledge required to effectively take part in financial systems (Atkinson & Messy, 2012, 2011). Regardless of an increase in access to banking infrastructure and services, and digital financial solutions through mobile phones, a large part of the population remains excluded due to cultural, behavioral, and informational barriers (Geach, 2007; Said et al., 2021; Sikka & Bhayana, 2024). Therefore, the understanding of how financial literacy interacts with the financial inclusion is remain a persistent question of research with policy implications.

Financial literacy is conceptualized as an individual ability to understand, acquire and apply financial knowledge in their personal well-being and in economic decision making (Lusardi & Mitchell, 2014). According to Human Capital Theory (Becker, 1964), financial literacy can be seen as an investment in human capital, whereby the gaining of financial skills enhances the economic productivity of individuals, and improves capability of decision making. In recent years, academic researchers have consistently linked higher level of financial literacy with improved financial behaviors including budgeting, investing, saving, and debt management (Lusardi, 2019). However, global distribution of financial literacy remains highly unequal, with huge gender based gaps, education, geography, and income (Klapper & Lusardi, 2020). Specifically, women from rural areas and low income group individuals consistently shows lower level of financial knowledge and skills, strengthening economic demotion (Asongu & Zogo, 2025). According to OECD, (2023) and Sundarasen et al. (2023) women in different economies shows lower financial literacy as compared to men. Although traditional financial knowledge interventions have primarily focused on conveying cognitive knowledge, various reviews suggest that the structural constraint, socio cultural

norm, and behavioral biases often mediate the translation of knowledge into behavior (Fernandes et al., 2014; Goyal & Kumar, 2021; Rehman et al., 2019).

The relationship between financial literacy and financial inclusion is well supported but discloses notable changes across different contexts. Several studies found a positive relationship where a higher rate of financial literacy expect greater possibility of holding a bank account, using credit reasonably, and formal savings (Allen et al., 2016a; Grohmann et al., 2018). According to Grohmann et al., (2018), financial literacy is a strong anticipator of financial inclusion as compared to education or income alone. Fernandes et al. (2014), critically argue that the effect size of financial education interferences is often small, particularly when not reinforced by practical access to affordable financial products. Moreover, institutional barriers, such as high transaction costs, mistrust in banks, and regulatory inefficiencies, can undermine the impact of financial literacy (Klapper & Lusardi, 2020). Thus, while financial literacy is necessarily important for financial inclusion, but it is insufficient without the improvement in financial system. Fonseca et al., (2012) and Hsu (2016), found that men are provide with more opportunities as compare to women from which they can increase their financial knowledge, it is simply because they are more involved in household finance, whereas women usually bear the responsibility of household activities, typically less involve in financial issues. This gap is larger in developing economies where women lack of financial knowledge result in increasing disparity in access to financial services as compared to men (Chen & Ronald P. Volpe, 2002; Fonseca et al., 2012; Hsu, 2016). In majority of cases, women do not take primary responsibility of financial matter including managing money until a sudden life crisis, including the death of their spouse or divorce from spouse, increases this gap (Bucher-Koenen et al., 2012; Hsu, 2016). Furthermore, Chen & Volpe, (2002) also found that the women less interested in studying finance as compared to men, this attitude is further contributing to the existing gap. Additionally, the report by International Monetary Fund shows that the substantial portion of unbanked population around the world is compromises of women(IMF, 2020).

The finding of surveys conducted by OECD, (2023) and World Bank, (2022), shows that women scores less in basic and advanced level financial literacy measures in all the economies of survey as compared to men. Study by Hasler & Lusardi, (2017), shows that women are less likely to correctly answer the question about compounding of interest, diversification of risk, and inflation not only in less developed nations but also in high income countries. It's suggests that this gap is not just filled by education alone. This was supported by Klapper et al., (2013), who found that understanding of the financial risk is considerably lower in females as compared to the men, even after adjusting for education, occupation, and income.

Numerous studies show that the differences in financial literacy are not only due to an issue in knowledge, but these differences are caused by various other factors such as confidence and risk attitude. Bucher-Koenen et al., (2021), found that even high knowledgeable women score themselves lower in financial competencies as compared to men. This gap in confidence affects the

financial planning and behavior in relation to taking risk among genders (Bannier & Neubert, 2016). Lusardi & Tufano (2015), found that women are debt avoidant and they were less likely to search for competing financial products because of lower financial self-confidence. This psychological barrier among women restricts them to take an active part in financial system even when they have an adequate level of knowledge.

In today's digitalized economy, having digital financial literacy is essential in order to effectively use different digital financial services such as internet banking, mobile banking, digital wallets, and many others. Digital financial literacy is inherently connected with financial literacy, without having basic understanding of financial concepts like saving, budgeting, and managing debt, individuals may face difficulties in using digital platforms effectively and to take full benefit of it, especially women (Fauzi et al., 2020; Imjai et al., 2025). Women from rural area and low-income level background, faces more challenges and barriers in using or understanding financial services, and also have less confidence in making financial decisions. This is because of lower financial literacy and a lack of holding a self-smartphone with internet connection (GSMA, 2023; Sundarasen et al., 2023). Lyons et al., (2022), found that financial literacy is very crucial for financial inclusion, as women's ability to effectively and confidently access and use the digital services is directly correlated with their understanding of general financial concepts. Therefore, it is needed to bridge this gender base gap in financial literacy in, order to improve financial decision making, but also ensure that women get full benefits from the services offered by digital financial systems (Rozalinda et al., 2024; Sadaf, 2025).

The theoretical framework for examining the gender base gap in financial literacy and its impact on financial inclusion is grounded in the utilization of Social Role Theory, Human Capital Theory, and Capability Approach. According to Human Capital Theory (Becker, 1964), the development of skills and education, including financial literacy, contributes towards the improvement in economic outcomes. This theory highlights the importance of getting knowledge and skills, but it fails to fully explain the barriers a woman can face in converting their financial knowledge into financial decision-making independence. Several studies show that women having the same level of financial education and expertise as man, they still face several barriers, i.e. cultural and institutional, that make it difficult to implement their knowledge through financial decisions (Bucher-Koenen et al., 2021; Lusardi & Tufano, 2015). Social capital theory (Eagly & Wood, 2012) highlights this disconnection by showing how traditional gender roles shape the expectations. Women are still not allowed to make financial decisions even at household level, which leads to lower their confidence and engagement with different financial systems, irrespective of their level of knowledge and capabilities (Roy & Patro, 2022). The most important perspective is explained by Capability Approach (Sen, 1999), which is not just about how much financial literacy women hold, but about whether they have the freedom to act according to their knowledge and expertise

independently. Even when the financial services are easily accessible, women are constrained by various factors including cultural and social norms, law's restrictions, and lack of financial control.

Hypotheses:

H_1: Higher the gap in account ownership among genders, the more negatively it affects the financial inclusion.

H_2: Lower the gender gap in borrowing behavior, the more positively it affects the financial inclusion.

H_3: Lower the gender gap in saving behavior, the more positively it affects the financial inclusion

H_4: Higher the gap in literacy among genders, the lower the financial inclusion.

3. Methodology

3.1 Sample

For designing the research model and testing the proposed hypothesis, data on financial literacy and financial inclusion were collected from global databases. The main databases used to collect the data were the World Bank Global Findex index and the UNESCO Institute for Statistics (UIS). The Global Findex index provides a wide range of data on how people engage with financial services, including borrowing and saving aptitude by gender; this data set was widely used in cross-country research of a similar nature (Demirguc-Kunt et al., 2018). Similarly, UNESCO (UIS) data helped in capturing literacy-related data that acts as the proxy measure of financial capability and awareness (UNESCO, 2021). A total of 80 developing economies around the globe are selected based on the income level classification by the World Bank, which includes low, lower middle, and upper middle income level countries, subject to the availability of data (World Bank, 2021). This study covers the years 2011, 2014, 2017, and 2021, aligning with the Global Findex data, which is released every three to four years. This allows the study to capture a decade trend (Global Findex Database, 2021). These economies are selected with an emphasis on ensuring geographical diversity. Out of these 80 countries, 29 countries are from Africa, 27 countries from Asia, 17 countries from Latin America and the Caribbean, 05 countries are from Europe, and 02 countries are transcontinental. This is important not only to ensure worldwide representation but also to capture differences in financial literacy and access formed by institutional and socio-economic settings (Allen et al., 2016b).

3.2 Research Instruments

To ensure conceptual clarity of key variables, this study adopts the established definition of its constructs. Financial literacy is defined as the combination of skills, knowledge, behavior, attitude, and awareness in order to make sound financial decisions to achieve financial well-being (Lanciano, 2025; Lusardi & Messy, 2023; Lusardi & Mitchell, 2014, 2023; OECD, 2023). Women's participation in the financial system is the extent to which women's engagement or access to formal financial institutions for account ownership, saving, and borrowing facilities (Allen et al., 2016a; World Bank, 2022).

To observe the relationship between the gender gap in financial literacy and financial inclusion across the developing economies, a set of variables is obtained from different databases. Financial inclusion is measured as a number of ATMs per 100,000 adults, a widely recognized proxy for the financial system (Allen et al., 2016b). Financial literacy is assessed using the gender gap in four core areas, which include account ownership, saving behavior, adult literacy, and borrowing. This demonstrates the gap between men and women in education level and financial behavior. This gap allows us to better understand, how differences in financial literacy and access to financial services affect financial inclusion (Hasler & Lusardi, 2017; Klapper & Lusardi, 2020; Lusardi & Mitchell, 2014). Table 1 shows a complete overview of study variables with their definition and sources.

Table 1: Details of Variables

Variable	Measurement	Sources
ATM	Number of ATMs per 100,000 reported in a country	World Bank Data Indicator (World Bank, 2021)
Gender Gap in Account Ownership	The gap in the percentage of account owners who are men and women	Global Findex Index (Global Findex Database, 2021)
Gender Gap in Saving	The gap in the percentage of formal/informal savings among men and women	Global Findex Index (Global Findex Database, 2021)
Gap in formal borrowing	The disparity in the percentage of formal/informal borrowing among men and women	Global Findex Index (Global Findex Database, 2021)
Gap in literacy rate	The difference in the literacy level of women and men	UNESCO (UNESCO, 2021)

3.3 Econometric Model

To investigate the impact of the gender gap in financial literacy on financial inclusion, this study used a linear panel regression model. The following equation is developed to achieve the study objective:

$$ATM_{it} = \beta_o + \beta_1(Account\ gap)_{it} + \beta_2(Saving\ gap)_{it} + \beta_3(Borrowing\ gap)_{it} + \beta_1(Literacy\ gap)_{it} + \mu_{it} + \varepsilon_{it}$$

Whereas μ_{it} shows country specific effect, and ε_{it} is the error term.

3.4 Analysis Technique

The Panel data regression techniques are used to analyze the impact of gender gap on financial inclusion. This approach allows to control unobserved heterogeneity across countries and time, and to improve the internal generalizability and validity of the results (Baltagi, 2008; Hsiao, 2014). The study employs both Fixed Effect and Random Effect Model, along with Hausman Test to determine the most suitable and appropriate model for the study. The fixed effect model control for county specific attributes that remain constant over the years, while random effect model captures the efficiency gain under the assumption that there is no correlation among unobserved effects and the explanatory variables (Wooldridge, 2010). In order to ensure robustness, the Variance Inflation Factor (VIF) score is calculated to check multicollinearity among explanatory variables

4. Data Analysis

4.1 Descriptive Statistics

Table 2 displays the descriptive statistics of all the study variables. ATM penetration has a mean of 37.65 with a substantial, cross-country variation ranging from 0.9 to 185.41. This shows the wide gap in financial infrastructure. The average account ownership gap among genders is 7.4%, indicating that women are less likely to hold a bank account as compared to men in most of the countries. Similarly, the average gender gap in borrowing is 3% and saving is 4.9% showing that women do not save and borrow as same as men. The average literacy gap between genders is 6.539, which shows that women are less literate than men because of continuous education inequalities across countries.

Table 2: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
ATM	301	37.65	29.802	0.90	185.41
Account Gap	298	0.074	0.084	-0.15	0.49
Borrowing Gap	298	0.03	0.043	-0.07	0.27
Saving Gap	223	0.049	0.057	-0.10	0.23
Literacy gap	109	6.539	8.25	-17.187	27.0

Note: Authors own calculation

4.2 Correlation Analysis

Pairwise correlation coefficient is presented in Table 3, which offers initial understandings of relationships between gender gaps in financial literacy and financial inclusion. A negative significant relationship between ATM and account gap ($r = -0.208$, $p < 0.01$), suggests that a lower gap in account ownership will contribute to a better financial system. A significant positive relationship between borrowing gap and ATM, shows that the current infrastructure is men oriented but at the same time, if the borrowing trend increases in women, tends to increase financial inclusion. Whereas the saving gap has weak non-significant relationship. Literacy gap is strong negative significant association with ATM, highlighting that an increase in educational level among women as compared to men tends to increase the financial structure across countries.

Table 3: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) ATM	1.000				
(2) Account Gap	-0.208***	1.000			
	(0.000)				
(3) Borrowing Gap	0.187***	0.375***	1.000		
	(0.002)	(0.000)			
(4) Saving Gap	0.013	0.281***	0.260*	1.000	
	(0.847)	(0.000)	(0.000)		
(5) Literacy Gap	-0.515***	0.320***	-0.224**	0.068	1.000
	(0.000)	(0.001)	(0.024)	(0.577)	

**** p<0.01, ** p<0.05, * p<0.1 Note: Authors own calculation*

4.3 Regression Analysis

4.3.1 Fixed Effect model

The fixed effect model estimation results are presented in Table 4, which shows overall weak and no statistically significant results at 5% level of confidence. The only positive significant result is shown by saving gap at 10% level of confidence, suggesting that an increase in saving among women and men will tend to increase financial inclusion. Furthermore, all the other key variables like account gap, literacy gap and borrowing gap are not significant at all, and F-test is also not statistically significant, shows that the model not explain adequately within country variation.

Table 4: Fixed Effect Model

ATM	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Account Gap	16.18	49.641	0.33	0.748	-88.554	120.914	
Borrowing Gap	20.478	78.523	0.26	0.797	-145.191	186.147	
Saving Gap	115.689	65.611	1.76	0.096	-22.739	254.117	*
Literacy Gap	0.68	1.935	0.35	0.73	-3.402	4.761	
Constant	25.757	13.54	1.90	0.074	-2.811	54.325	*

Mean dependent var	39.591	SD dependent var	30.463
R-squared	0.250	Number of obs.	66
F-test	1.416	Prob > F	0.219
Akaike crit. (AIC)	429.487	Bayesian crit. (BIC)	440.436

*** p<.01, ** p<.05, * p<.1*
Note: Authors own calculation

4.3.2 *Random Effect model:*

The random effect model estimation results are presented in Table 5, provides improve model performance, and more efficient estimates to support the overall study objectives. The gender base gap in formal borrowing is positively significantly associated with financial inclusion (β = 131.85, p = 0.026), supporting hypothesis 2. This result shows that when women borrow same as of men, will tends to increase the financial infrastructure. Similarly, saving gap among gender also shows a positive marginal significant association with financial inclusion (β = 83.73, p = 0.074), provide support to hypothesis 3. Literacy gap has demonstrated a strong negative highly significant effect on financial inclusion (β = -1.748, p < 0.001), providing support to hypothesis 4. This result is aligned with theoretical expectation as well, that the gap in literacy level among men and women directly constrains the women to access and effectively use the financial infrastructure, also in line

with the capability approach(Sen, 1999). In contrast, gender gap in account ownership have a negative coefficient (β = -6.098) but statistically insignificant, providing no support to hypothesis 1, although it provides directional support that an increase in the gap will reduce financial inclusion. This might be due to a large number of inactive accounts, which do not necessarily show meaningful engagement of financial services(Lusardi & Tufano, 2015). The overall R-squared of 0.438 indicates variation in financial inclusion is sufficiently explained by the gender gap in financial behavior and literacy.

Table 5: Random Effect

ATM	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Account Gap	-6.098	38.822	-0.16	0.875	-82.187	69.991	
Borrowing Gap	131.852	59.408	2.22	0.026	15.415	248.29	**
Saving Gap	83.733	46.88	1.79	0.074	-8.151	175.617	*
Literacy Gap	-1.748	0.458	-3.82	0.00	-2.646	-0.85	***
Constant	41.926	5.673	7.39	0.00	30.807	53.044	***

Mean dependent var	39.591	SD dependent var	30.463
Overall r-squared	0.438	Number of obs	66
Chi-square	37.658	Prob > chi2	0.000
R-squared within	0.156	R-squared between	0.469

**** p<.01, ** p<.05, * p<.1*
Note: Authors own calculation

4.3.3 *Model Selection:*

Hausman (1978) model specification test is used to determine which model appropriately explain the study. Table 6 provide support for selecting Random Effects Model (χ^2 = 7.507, p = 0.111), which assumes that there is no correlation among unit-specific effect and explanatory variables.

Table 6: Hausman (1978) specification test

	Coef.
Chi-square test value	7.507
P-value	0.111

Note: Authors own calculation

4.4 Multicollinearity

To check the multicollinearity among variables, variance inflation factor test was conducted as shown in Table 7. All the values are below the threshold of 5, suggest that multicollinearity is not a concern in the model.

Table 7: Variance inflation factor

	VIF	1/VIF
Literacy Gap	1.622	.616
Account Gap	1.586	.63
Borrowing Gap	1.433	.698
Saving Gap	1.085	.922
Mean VIF	1.432	.

Note: Authors own calculation

5. Discussion and Conclusion

The overall objective of this study is to examine how the gender gap in financial literacy influences financial inclusion. Financial inclusion is proxied by ATM penetration, whereas gender-based gap in literacy, savings, borrowing, and account ownership was used to cover the multidimensional landscape of financial inequality across the panel of 80 developing economies of the World. The analysis as shown in previous sections was aligned with theoretical support by Human capital theory (Becker, 1964), explains how individual level economic activities drive institutional responses, Capability Approach (Sen, 1999), argue that real inclusion is no merely require access to system, but the freedom to use and the ability to effectively utilize the services and the Social Role Theory (Eagly & Wood, 2012), which focused on individual patterns in behavior and their expectations. Together, these frameworks helped in to form hypothesis and interpret the results. The finding of the study offers in-depth understanding how different gender-based gap affect the financial inclusion and how it interact with Sustainable Development Goals (UN, 2015).

The first hypothesis does not get strong support, which anticipates that the higher the gap in account ownership between genders, the more negatively it affects financial inclusion. Although a negative coefficient provides directional support to the hypothesis, this result contributes to the evidence that account ownership does not always translate to regular usage to enhance financial inclusion (Allen et al., 2016b). In developing and low-income level countries, women acquire accounts through digital ID initiatives or by aid programs, but most of these accounts become dormant due to non-usage or mostly managed by men present in their families. This aligned with capability approach (Sen, 1999), says that inclusion remains worthless unless it was backed by control and power to make decision independently.

The second hypothesis highlights that the lower the gender gap in borrowing behavior, the more positively it affects financial inclusion. The findings aligned with Human Capital Theory (Becker, 1964; Rehman et al., 2019), as borrowing denotes the active involvement with financial infrastructure by generating transactional history and a relationship with the service provider (Grohmann, 2018). This also supports SDG 8 by specifically targeting credit access. When women have access to credit, they not only benefit themselves, but it also creates country-level incentives to increase financial inclusion. This also supports SDG 1 and SDG 5, as women's access to credit improves their household flexibility, and in building assets or starting small businesses.

The third hypothesis is lower the gender gap in saving behavior, the more it positively affects financial inclusion also received significant support. It reflects the trust in financial institutions and financial planning, which contributes towards long term inclusion (Dupas & Robinson, 2013). From the Social Role Theory (Eagly & Wood, 2012) point of view, an increase in saving behavior in women indicates an exit from historical financial roles. As women tend to increase savings formally, they have become the stakeholders, challenging traditional norms that primarily consider women as consumers (Croson & Gneezy, 2009). This finding remains supportive of SDG 1 and SDG 10, as an increase in saving opportunities reduces the sensitivity and promotes asset building.

The statistically strongest and conceptually most important result comes from the literacy gap, supporting hypothesis 4, which anticipates that the higher the gap in literacy between genders, the lower the financial inclusion. This strong support underlines the importance of literacy among women, highlighting that without basic knowledge, they were unable to effectively take advantage of the financial system and access to financial activities remains inaccessible (Lusardi & Mitchell, 2014; Lyons et al., 2006; Xu & Zia, 2012). Practically, literacy works as a bridge between access to service and their efficient usage. This finding strengthens SDG 5, as literacy is not only a human right but also a criterion for equitable distribution. Similarly, SDG 8 cannot be achieved without addressing the inequalities in education, as financial resources remain under-utilized if women are not aware of how to properly use them for their well-being, regardless of how accessible the financial infrastructure. It also implies SDG 17, that indicates different institutions must collaborate together in order to provide education, financial knowledge by making gender specific institute for women. As financial inclusion is not only a banking issue, it has interdisciplinary effects socially and institutionally.

In conclusion, this study provides strong evidence in support that not all gender gaps in financial literacy equally influence financial inclusion. The finding shows that the gender gap in literacy, saving, and borrowing has a significant impact on shaping how the financial system of the country responds and adapts to the changes to develop financial infrastructure. This aligned with the theoretical underpinning that institutes are more actively responsive to informed financial behavior (Becker, 1964; Eagly & Wood, 2012; Sen, 1999). While a gap in account ownership provides directional support only as it is influenced by non-usage of accounts, it suggests that formal access is not sufficient to transform into inclusion. Moreover, it supports the argument that financial

inclusion is about the capacity and usage, not merely the coverage. Furthermore, the study has policy implications aligned with Sustainable Development Goals, specifically SDG 1 (No Poverty), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), SDG 10 (Reduced Inequalities) and SDG 17 (Partnership for Goals) (United Nations, 2015), highlight that effective financial inclusion will promotes SDGs across country.

Despite a meaningful contribution to the literature, several limitations are there. Firstly, ATM penetration, which was widely used as a proxy of financial inclusion, could not capture larger impact of digital financial inclusion, mainly in economies where digital infrastructure is replacing traditional systems. Secondly, the unavailability of data of potentially relevant factors that influence the result i.e., legal structure and societal and cultural norms. Future research needs to overcome this limitation by addressing this shortcoming. There is a strong need to use household-level data to examine how the financial behavior varies among different gender groups, economic conditions, cultural dynamics and, the initiative taken for women.

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