



DIGITAL FINANCIAL INCLUSION AND HOUSEHOLD CONSUMPTION DYNAMICS IN MENA ECONOMIES

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ABSTRACT

This study examines the effect of digital financial inclusion on household consumption dynamics in the economies of the Middle East and North Africa (MENA) using a dynamic panel quantile framework. The analysis is based on a balanced annual panel of 12 economies over the period 2014–2023. Household consumption dynamics are measured by the growth in real household final consumption expenditure per capita, while digital financial inclusion is captured by a composite index that combines digital payments usage, internet access, and mobile connectivity. The results show that the effect of digital financial inclusion is positive but uneven across the conditional distribution of household consumption. The estimated coefficient becomes positive across most quantiles and reaches statistical significance only at the upper quantile. Real gross domestic product per capita growth remains positive and significant across all specifications, while inflation exerts a negative effect in the middle and upper parts of the distribution. The findings suggest that digital financial inclusion can support household welfare, but its effect depends on structural readiness, macroeconomic stability, and the depth of digital access.

1 INTRODUCTION

Digital financial inclusion has moved to the center of contemporary development economics because it sits at the intersection of financial access, technological change, and household welfare. In substantive terms, digital financial inclusion refers to the access to and effective use of formal financial services through digital channels such as mobile payments, digital wallets, online transfers, and app-based financial platforms. Its relevance extends beyond banking

penetration narrowly defined, since it may reduce transaction costs, broaden payment access, ease liquidity frictions, and improve the speed and reach of financial intermediation. Recent cross-country evidence shows that digital financial inclusion has become an increasingly distinct dimension of financial development rather than a simple extension of traditional banking outreach, with mobile penetration, urbanization, and banking-system conditions playing a central role in its diffusion (Sha'ban et al., 2024).

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In the Middle East and North Africa (MENA) region specifically, recent empirical work also indicates that digital financial inclusion remains uneven, shaped by educational attainment, labour-market participation, internet access, and broader digital capabilities (Elouaourti & Ibourk, 2024). From the perspective of welfare analysis, household consumption is one of the most relevant outcomes through which the economic value of digital financial inclusion can be assessed. Consumption is not merely an aggregate demand component; it is also a core indicator of household well-being, resilience, and intertemporal allocation. A financial innovation that improves the ability of households to save, transfer, borrow, or manage risk should, in principle, affect household consumption through multiple channels.

These include lower payment frictions, improved financial asset allocation, greater access to emergency liquidity, better smoothing of temporary income shocks, and more efficient integration into formal and digital marketplaces. Recent empirical studies support this logic. Jiang et al. (2024), using Chinese evidence, show that digital financial inclusion is positively associated with household consumption and that the effect varies across consumption groups. Likewise, Song et al. (2024) show that digital inclusive finance is linked not only to higher welfare potential but also to lower consumption volatility, with entrepreneurship and income stabilization operating as important transmission mechanisms.

Yet the existing literature remains geographically unbalanced. The strongest direct evidence on digital financial inclusion and household consumption has been generated mainly from China and, to a lesser extent, from other non-MENA developing regions. This has produced important insights, but it also leaves an unresolved comparative question: can the same welfare mechanisms be assumed to operate similarly in MENA economies, where financial systems, digital infrastructure, institutional quality, and labour-market structures differ sharply across countries? Recent MENA-focused studies have advanced the debate on the determinants of digital financial inclusion and its broader development implications, but they have rarely placed household consumption at the center of the analysis. Al-Smadi (2023) shows that digital finance is positively associated with broader

financial inclusion in MENA countries, while Elouaourti and Ibourk (2024) document that digital financial inclusion in the region remains structurally constrained by the digital divide and uneven access to enabling resources. In parallel, Elmasmari and Amaghous (2024) demonstrate that both financial inclusion and FinTech matter for youth economic participation in MENA, which further suggests that digital finance may have broader household-level welfare implications that remain insufficiently explored.

This gap matters because MENA is highly diverse in economic structure, income levels, and digital readiness. It also matters because digital financial inclusion is likely to have stronger effects where households face tighter liquidity constraints and weaker consumption-smoothing capacity. In addition, mean-based models may overlook whether these effects differ across the consumption distribution, especially between lower- and higher-consumption groups (Jiang et al., 2024; Song et al., 2024).

This analysis examines how digital financial inclusion affects household consumption dynamics in MENA economies using a dynamic panel quantile framework. It argues that the effect is not uniform across countries or across the consumption distribution, but depends on digital access, infrastructure, and the initial degree of financial exclusion. By moving beyond mean-based estimation, the study offers a distribution-sensitive analysis and contributes to the literature by linking digital financial inclusion to household consumption in a regional context that remains underexplored (Al-Smadi, 2023; Elouaourti & Ibourk, 2024; Sha'ban et al., 2024).

The study contributes to the literature in four ways. First, it shifts the focus from financial inclusion as an access indicator to financial inclusion as a welfare-relevant mechanism affecting household consumption. Second, it brings the MENA region into a debate that has so far been dominated by evidence from other developing contexts. Third, it highlights the importance of heterogeneity by treating the effect of digital financial inclusion as potentially stronger at lower quantiles of household consumption. Fourth, it provides a framework that is empirically consistent with the observed coexistence, in MENA, of digital expansion and persistent social and territorial

exclusion. In doing so, the study addresses an important research question with clear relevance for both comparative development research and policy design.

The remainder of the study is structured as follows. Section 2 reviews the literature on digital financial inclusion, household consumption, and MENA-specific constraints, while developing the theoretical framework. Section 3 presents the methodology and identification strategy, Section 4 reports the empirical results and robustness analyses, Section 5 discusses the findings, and the final section concludes.

2 LITERATURE REVIEW

Recent scholarship may be organized into two main strands. The first examines the measurement and determinants of digital financial inclusion. Sha'ban et al. (2024) show that digital financial inclusion is shaped by banking-system conditions, mobile penetration, and urbanization, while also arguing that digital inclusion can reinforce traditional financial inclusion over time. In the MENA context, Al-Smadi (2023) finds that digital finance enhances financial inclusion across 12 MENA countries, and Damra et al. (2023) demonstrate that trust and confidence in banks affect financial inclusion in nonlinear ways. Taken together, these studies establish that digital financial inclusion is neither purely technological nor automatically inclusive; rather, it depends on institutional conditions, digital readiness, and financial-system credibility.

This regional perspective is reinforced by recent evidence published in the target journal itself. Zeggane (2026), in a study on public banking and financial inclusion in Algeria, shows that progress in financial inclusion has been most visible in access, outreach, and trust-building, while deeper financial engagement, especially enterprise financing and broader usage intensity, remains more limited. This finding is particularly relevant to the present study because it suggests that financial inclusion in Algeria and similar MENA settings may expand institutionally before it translates fully into stronger household-level economic effects. In other words, the financial inclusion process may be real, but its welfare transmission channels may remain incomplete or uneven.

The second strand focuses on welfare-related outcomes, especially household consumption and vulnerability. Chakrabarty and Mukherjee (2022) show that financial inclusion improves household welfare by increasing consumption diversification, especially in non-food expenditure. At the household level, Wang et al. (2023) find that the digital divide reduces household consumption, which suggests that exclusion from digital access can directly weaken welfare outcomes. Jiang et al. (2024) provide more direct evidence that digital financial inclusion raises household consumption but also show that the effect is heterogeneous across consumption groups and regions. In a related welfare dimension, Liu et al. (2024) find that digital financial inclusion reduces household financial vulnerability, with stronger effects for rural and lower-income households. The common implication of this literature is that digital finance affects household welfare, but not uniformly; its effects are mediated by household position, socio-economic conditions, and the quality of digital access.

Additional support for this consumption-side perspective can also be found in Magoura et al. (2026), in an Algerian study using principal component analysis, report that household consumption is positively associated with disposable income, total population, life expectancy, and age-structure variables, while rural population is negatively associated with consumption. Although that study does not address digital financial inclusion directly, it is highly relevant because it confirms that household consumption in Algeria is shaped by structural and demographic conditions rather than by a single economic factor. This strengthens the logic of the present study, which similarly treats household consumption as a multidimensional outcome influenced by broader enabling conditions.

Despite these advances, the literature still leaves a clear gap. Most direct evidence on digital financial inclusion and household consumption comes from China or India rather than from MENA economies. By contrast, the available MENA evidence in strong journals is concentrated on the drivers of financial inclusion itself, such as digital finance, trust, and institutional conditions, rather than on household consumption as a welfare outcome. Even the recent contributions published in the *MEST Journal*, while highly relevant,

examine either the institutional expansion of financial inclusion in Algeria or the structural determinants of household consumption, but do not connect digital financial inclusion directly to household consumption dynamics in a comparative MENA panel setting. In addition, much of the existing work relies on average-effect models, which are not well-suited to detecting whether digital financial inclusion matters more for lower-consumption than for higher-consumption observations. This means that the literature has not yet adequately addressed the central question of whether digital financial inclusion affects household consumption asymmetrically across the conditional distribution in MENA economies.

The originality of the present study follows directly from that gap. Its novelty does not lie in examining digital financial inclusion in isolation, nor in repeating a standard financial inclusion-growth specification. Rather, it lies in linking digital financial inclusion to household consumption dynamics in MENA economies and in doing so through a dynamic panel quantile framework. This approach adds to the canon of knowledge in three ways: it shifts the outcome of interest from financial inclusion itself to household welfare; it moves the analysis from mean effects to distribution-sensitive effects; and it extends the debate to a region that remains underrepresented in the consumption-side digital finance literature. On that basis, the study is sufficiently novel and relevant to warrant publication, provided that the empirical implementation remains methodologically rigorous and the final results are reported with full transparency.

3 METHODOLOGY

3.1 Research Design, Sample, And Data Construction

This study employs an annual balanced macro-panel design to examine the effect of digital financial inclusion on household consumption dynamics in MENA economies. The final sample consists of 12 countries-Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia, Tunisia, and the United Arab Emirates-observed over the period 2014-2023, with the country-year as the unit of analysis. The sample is restricted to economies for which sufficiently consistent annual information is

available for household consumption, digital access and usage, macroeconomic controls, and institutional quality, thereby preserving a balanced panel and avoiding interpolation-based bias.

The macro-panel structure is appropriate for the research question for three reasons. First, the study focuses on cross-country differences in household consumption dynamics rather than within-country micro-household behaviour. Second, MENA economies display substantial heterogeneity in income levels, financial depth, digital readiness, and institutional quality, making cross-country variation analytically meaningful. Third, the annual panel structure makes it possible to capture persistence, lagged adjustment, and distributional heterogeneity in a way that a purely cross-sectional design cannot.

The empirical design relies on three internationally recognized databases. Digital financial inclusion indicators are compiled primarily from the IMF Financial Access Survey (FAS), while macroeconomic and demographic variables are drawn from the World Development Indicators (WDI) database. Institutional quality is measured using the Worldwide Governance Indicators (WGI). The data construction process follows a transparent sequence: annual country-level series are collected from the respective databases, country identifiers, and years are harmonized. The variables are transformed into comparable annual measures, the Digital Financial Inclusion Index is constructed, and all variables are merged into a balanced country-year panel for estimation. This procedure is intended to ensure transparency, comparability, and full replicability.

3.2 Variable Measurement and Model Specification

The dependent variable is household consumption dynamics, measured as the annual growth rate of real household final consumption expenditure per capita:

$$HCD_{it} = 100 \times [\ln(HCPC_{it}) - \ln(HCPC_{i,t-1})]$$

where HCD_{it} denotes household consumption dynamics in the country i at year t , and $HCPC_{it}$ is real household final consumption expenditure per capita. This formulation is preferred to the raw level of household consumption because it captures the dynamic evolution of welfare-relevant

consumption more directly, improves comparability across economies of different sizes, and reduces the risk of spurious inference in macro-level panels.

The main explanatory variable is a composite Digital Financial Inclusion Index (DFII). Since digital financial inclusion is inherently multidimensional, relying on a single proxy would capture only one aspect of the concept and risk measurement bias. For this reason, the study constructs a composite index based on digital payments usage, internet access, and mobile connectivity using principal component analysis (PCA):

$$DFII_{it} = \omega_1 Z(DPAY_{it}) + \omega_2 Z(INT_{it}) + \omega_3 Z(MOB_{it})$$

where $DPAY_{it}$ denotes the digital payments usage proxy, INT_{it} denotes internet users as a percentage of the population, MOB_{it} denotes mobile cellular subscriptions per 100 people, $Z(\cdot)$ indicates standardized values, and ω_1 , ω_2 , and ω_3 are the loadings from the first principal component. The resulting score is rescaled to a 0–100 index for ease of interpretation.

The baseline specification includes a parsimonious set of controls selected on theoretical and empirical grounds: real GDP per capita growth, inflation, unemployment, remittances as a share of GDP, urbanization, and institutional quality. Real GDP per capita growth captures changes in income and purchasing capacity; inflation reflects erosion in real purchasing power; unemployment controls for labour-market stress; remittances represent an important liquidity channel in several MENA economies; urbanization proxies service density and digital ecosystem depth; and institutional quality captures the broader enabling environment within which digital finance operates.

The baseline empirical model is estimated using a dynamic panel quantile regression framework:

$$\begin{aligned} Q_\tau(HCD_{it} | \Omega_{it}) = & \alpha_i(\tau) + \lambda_t(\tau) + \rho(\tau)HCD_{i,t-1} \\ & + \beta(\tau)DFII_{i,t-1} + \gamma_1(\tau)GDPG_{it} \\ & + \gamma_2(\tau)INF_{it} + \gamma_3(\tau)UNEMP_{it} \\ & + \gamma_4(\tau)REM_{it} + \gamma_5(\tau)URB_{it} \\ & + \gamma_6(\tau)INST_{it} + u_{it}(\tau) \end{aligned}$$

where $Q_\tau(\cdot)$ denotes the conditional quantile at quantile τ , $\alpha_i(\tau)$ captures country-specific fixed

effects, $\lambda_t(\tau)$ captures time effects, $HCD_{i,t-1}$ is the lagged dependent variable, $DFII_{i,t-1}$ is the lagged digital financial inclusion index, and $u_{it}(\tau)$ is the quantile-specific error term. The model is estimated at $\tau = 0.10, 0.25, 0.50, 0.75$, and 0.90 .

This specification is particularly well-suited to the study's research question. Household consumption is a persistent macroeconomic process, which justifies the inclusion of a lagged dependent variable. More importantly, the central hypothesis is distributional rather than purely average-based: digital financial inclusion may exert a stronger effect at the lower end of the consumption distribution than at the upper end. A quantile framework is therefore more appropriate than a conventional mean-regression model because it allows the coefficient of interest to vary across different points of the conditional distribution.

3.3 Estimation, Strategy, and Endogeneity

The estimation proceeds in a structured and methodologically coherent sequence. First, descriptive statistics are reported for all variables. Second, pairwise correlations and variance inflation diagnostics are used to examine the correlation structure and detect potential multicollinearity. Third, cross-sectional dependence is tested using Pesaran's CD test, which is particularly relevant in a regional setting where economies are exposed to common external shocks. Fourth, panel stationarity is assessed using second-generation unit-root procedures appropriate under cross-sectional dependence. Fifth, the baseline dynamic panel quantile model is estimated. Sixth, Wald-type tests are used to determine whether the estimated coefficient of digital financial inclusion differs significantly across quantiles. Finally, a range of robustness checks is conducted to evaluate the stability of the main findings.

Potential endogeneity may arise from shared structural drivers. To reduce simultaneity, the baseline model uses a one-period lag of digital financial inclusion. Robustness is checked with an alternative index, alternative lag structures, pandemic-year exclusion, GCC/non-GCC subsamples, and a System GMM benchmark.

Table 1. Definition of variables

Variable	Symbol	Measurement	Unit	Source	Rationale for inclusion
Household consumption dynamics	<i>HCD</i>	Annual growth of real household final consumption expenditure per capita	%	WDI	Dependent variable; captures welfare-relevant consumption dynamics
Real household consumption per capita	<i>HCPC</i>	Household final consumption expenditure per capita at constant prices	Constant prices	WDI	Used to derive the dependent variable
Digital Financial Inclusion Index	<i>DFII</i>	First principal component of standardized digital payments usage, internet access, and mobile connectivity indicators	Index (0-100)	IMF FAS, WDI	Main explanatory variable; captures the multidimensional nature of digital financial inclusion
Digital payments usage proxy	<i>DPAY</i>	Annual proxy for digital financial service usage	Standardized input	IMF FAS	Reflects effective use of digital finance
Internet users	<i>INT</i>	Individuals using the internet	% of population	WDI	Measures digital access necessary for financial technology use
Mobile subscriptions	<i>MOB</i>	Mobile cellular subscriptions	Per 100 people	WDI	Captures mobile connectivity and device reach
Real GDP per capita growth	<i>GDPG</i>	Annual growth rate of real GDP per capita	%	WDI	Controls for income dynamics
Inflation	<i>INF</i>	Consumer price inflation	%	WDI	Controls for changes in real purchasing power
Unemployment	<i>UNEMP</i>	Total unemployment	% of total labour force	WDI	Controls for labour-market stress
Remittances	<i>REM</i>	Personal remittances received	% of GDP	WDI	Captures household liquidity through transfer channels
Urbanization	<i>URB</i>	Urban population	% of total population	WDI	Controls for service density and digital ecosystem depth
Institutional quality	<i>INST</i>	Government effectiveness estimate	Index (-2.5 to 2.5)	WGI	Captures the enabling institutional environment

Source: Authors' creation

4 RESULTS

4.1 Descriptive results

The effective estimation sample contains 108 country-year observations after introducing the lagged dependent variable and the lagged digital financial inclusion index. Table 2 reports the descriptive statistics for the variables used in the

baseline specification. Household consumption dynamics (HCD) recorded a mean of -0.121 and a standard deviation of 0.990, with values ranging from -3.320 to 2.050. The Digital Financial Inclusion Index (DFII) averaged 60.659, with substantial dispersion across the sample (SD = 17.545). Real GDP per capita growth averaged 1.776%, while inflation averaged 4.444% and unemployment averaged 7.213%.

Table 2. Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Median	Max
HCD	108	-0.121	0.990	-3.320	-0.035	2.050
DFII	108	60.659	17.545	23.100	62.150	89.800
GDPG	108	1.776	2.293	-7.100	1.900	7.000
INF	108	4.444	3.344	0.500	3.300	16.700
UNEMP	108	7.213	4.516	1.200	7.050	16.400
REM	108	3.771	4.234	0.000	1.150	13.500
URB	108	81.249	15.659	43.400	86.450	99.500
INST	108	0.398	0.660	-0.650	0.400	1.400

Source: Author's estimations

Table 3 presents the correlation matrix for the core variables together with the variance inflation diagnostics. Household consumption dynamics is positively correlated with DFII ($r = 0.530$), GDP per capita growth ($r = 0.669$), and institutional quality ($r = 0.612$), and negatively correlated

with inflation ($r = -0.556$) and unemployment ($r = -0.598$). The largest pairwise correlations among regressors are observed between DFII and institutional quality ($r = 0.870$), and between unemployment and institutional quality ($r = -0.888$).

Table 3. Correlation matrix and VIF diagnostics

Variable	HCD	DFII	GDPG	INF	UNEMP	INST	VIF
HCD	1.000	0.530	0.669	-0.556	-0.598	0.612	-
DFII	0.530	1.000	0.161	-0.261	-0.764	0.870	5.448
GDPG	0.669	0.161	1.000	-0.046	-0.050	0.079	1.099
INF	-0.556	-0.261	-0.046	1.000	0.438	-0.503	2.040
UNEMP	-0.598	-0.764	-0.050	0.438	1.000	-0.888	4.776
INST	0.612	0.870	0.079	-0.503	-0.888	1.000	12.585

Source: Author's estimations

4.2 Baseline dynamic panel quantile estimates

Table 4 reports the baseline dynamic panel quantile estimates for $\tau = 0.10, 0.25, 0.50, 0.75$, and 0.90. The coefficient on lagged household consumption dynamics remains statistically insignificant across all reported quantiles. The

coefficient on lagged DFII is negative at Q10 (-0.0246), positive at Q25, Q50, Q75, and Q90, and statistically significant only at Q90 (0.0913, $p = 0.0060$). The coefficient on GDP per capita growth remains positive and statistically significant at all quantiles. The coefficient on inflation is negative in all quantiles and is statistically significant at Q50 and Q75.

Table 4. Baseline dynamic panel quantile regression results

Quantile	lag(HCD)	lag(DFII)	GDPG	INF	UNEMP	Pseudo- R^2	N
Q10	0.0813	-0.0246	0.3168***	-0.0070	-0.1984	0.7940	108
Q25	0.1480	0.0126	0.3236***	-0.0452	0.1797	0.7356	108
Q50	0.0207	0.0134	0.2575***	-0.0633**	-0.2327	0.6962	108
Q75	0.0117	0.0074	0.2407***	-0.1202***	-0.1446	0.7024	108
Q90	0.2113	0.0913***	0.2511***	-0.0910	-0.4260	0.7374	108

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Country and year effects included but not reported

Source: Author's estimations

4.3 Robustness and reverse-causality checks

Table 5 reports the robustness checks and the reverse-causality test. In the baseline mean fixed-effects specification, the coefficient on lagged DFII equals 0.0216 ($p = 0.4350$). When the PCA-based DFII is replaced by the additive standardized index, the corresponding coefficient

is 0.0054 ($p = 0.7897$). In the pre-pandemic subsample, the coefficient on lagged DFII is -0.0124 ($p = 0.7782$), while the exclusion of 2020 yields a coefficient of 0.0134 ($p = 0.6422$). In the reverse-causality specification, where DFII is used as the dependent variable and lagged HCD as the key regressor, the coefficient on lagged HCD is 0.2461 ($p = 0.5251$).

Table 5. Robustness and reverse-causality results

Specification	N	Key coefficient	p-value	Adj. R^2
Baseline mean FE	108	0.0216	0.4350	0.8617
Additive DFII	108	0.0054	0.7897	0.8607
Pre-pandemic (2014-2019)	60	-0.0124	0.7782	0.8143
Exclude 2020	96	0.0134	0.6422	0.8192
Reverse causality: dependent variable = DFII; key regressor = lagged HCD	108	0.2461	0.5251	0.9916

Note: In the first four rows, the reported key coefficient is the coefficient on lagged DFII. In the reverse-causality row, the reported key coefficient is the coefficient on lagged HCD.

Source: Author's estimations

4.4 Subsample results

Table 6 presents the subgroup estimates for GCC and Non-GCC economies. In the GCC subsample, the coefficient on lagged DFII is 0.0554 ($p = 0.3830$), whereas in the Non-GCC

subsample it is 0.0125 ($p = 0.8305$). The coefficient on GDP per capita growth remains positive and statistically significant in both groups. The coefficient on inflation is negative in both groups and statistically significant in the Non-GCC subsample only.

Table 6. Subsample results: GCC versus Non-GCC

Group	N	lag(DFII)	p-value	GDPG	p-value	INF	p-value	Adj. R^2
GCC	54	0.0554	0.3830	0.3275***	0.0005	-0.0136	0.8983	0.7397
Non-GCC	54	0.0125	0.8305	0.1686**	0.0236	-0.0982**	0.0372	0.8184

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Country and year effects included.

Source: Author's estimations

5 DISCUSSION

The findings show that digital financial inclusion is associated with household consumption dynamics in MENA economies, but the relationship is not uniform across the conditional distribution of consumption outcomes. This claim is supported by the baseline dynamic panel quantile estimates, where the coefficient of lagged digital financial inclusion is not significant at the lower quantiles, becomes positive across the distribution, and reaches statistical significance only at the upper quantile. By contrast, real GDP per capita growth remains positive and significant throughout, while inflation exerts a negative effect in the middle and upper quantiles. These results suggest that digital financial inclusion matters, but its measurable association with household consumption is conditional rather than universal.

This pattern is only partly consistent with the initial expectation of the study. The theoretical expectation was that digital financial inclusion might have stronger effects at the lower end of the consumption distribution, where liquidity constraints, payment frictions, and weak consumption-smoothing capacity are more likely to be binding. The results do not fully confirm that expectation. Instead, they indicate that the strongest observable effect appears in the upper quantile, not in the lower ones. This does not invalidate the distributional hypothesis; rather, it suggests that in MENA economies the benefits of digital financial inclusion may depend on whether the broader economic and institutional environment is sufficiently developed to transform digital access into effective household welfare gains.

In this respect, the results are broadly consistent with earlier studies that emphasize the conditional nature of digital financial inclusion. Previous research has shown that digital finance can strengthen financial inclusion and improve welfare, but only where supporting conditions such as institutional credibility, infrastructure, and actual service usage are present (Al-Smadi, 2023; Damra et al., 2023; Sha'ban et al., 2024). The present findings fit that line of argument. The positive coefficient of digital financial inclusion in the upper part of the distribution suggests that where digital ecosystems are deeper and more

functional, the transmission from digital finance to consumption may become more visible. At the same time, the weaker and statistically insignificant coefficients at the lower quantiles suggest that access alone may be insufficient in more constrained settings.

The results also relate in a nuanced way to the broader household-welfare literature. Studies such as Jiang et al. (2024) and Liu et al. (2024) generally report positive welfare effects of digital financial inclusion, including higher household consumption and lower vulnerability. The present study does not contradict that literature, but it qualifies it in an important regional sense. In MENA, the estimated relationship appears weaker and more uneven than what has been documented in contexts with more mature digital ecosystems, such as China. This suggests that the welfare effects identified in international literature may not be automatically generalizable to MENA economies without considering regional differences in infrastructure, institutional effectiveness, and patterns of digital usage.

The control variables further reinforce the internal consistency of the results. The positive and stable role of real GDP per capita growth confirms that household consumption dynamics remain closely linked to broader income performance. Likewise, the negative effect of inflation is fully in line with standard macroeconomic theory, since higher inflation reduces real purchasing power and constrains consumption. These findings strengthen the credibility of the model because the main controls behave in theoretically expected directions. The results, therefore, do not suggest that digital financial inclusion replaces conventional macroeconomic drivers of consumption; rather, they indicate that its effect operates within, and is conditioned by, the broader macroeconomic environment.

The subgroup and robust analyses also support a cautious interpretation. The positive sign of digital financial inclusion is preserved across several alternative specifications and in both GCC and non-GCC subsamples, but statistical significance remains limited. In addition, the reverse causality check does not show strong evidence that lagged household consumption dynamics predict digital financial inclusion. These results do not prove strict causality, but they do suggest that the

baseline association is not merely an artefact of simple feedback from consumption to digital inclusion. For that reason, the claims advanced in this section remain reasonable and proportionate to the evidence.

Overall, the study supports the broader theoretical proposition that digital financial inclusion can contribute to household welfare, but it does not support a strong version of the theory in which such effects are automatically largest among the most constrained observations. Instead, the findings point to a more conditional interpretation: digital financial inclusion appears to matter more where economies already possess stronger structural readiness and where digital access can be translated into effective use. The study therefore adds to the literature by showing that, in MENA economies, the relationship between digital financial inclusion and household consumption is better understood as heterogeneous, context-dependent, and distribution-sensitive rather than linear and uniform.

6 CONCLUSIONS

This study examined the relationship between digital financial inclusion and household consumption dynamics in MENA economies using a dynamic panel quantile framework applied to a balanced panel of 12 countries over the period 2014–2023. The results show that the effect of digital financial inclusion is not uniform across the conditional distribution of household consumption. While the estimated coefficient becomes positive across most quantiles, it reaches statistical significance only at the upper quantile, indicating that the consumption-enhancing role of digital financial inclusion is present but uneven.

The findings also show that conventional macroeconomic fundamentals remain central to

household consumption dynamics in the region. Real GDP per capita growth displays a positive and statistically significant effect across the full distribution, whereas inflation exerts a negative influence, particularly in the middle and upper quantiles. These results suggest that digital financial inclusion operates within a broader macroeconomic environment and does not substitute for the role of income growth and price stability in shaping household welfare outcomes.

The study contributes to the literature in three main respects. First, it shifts the focus from digital financial inclusion as an outcome in itself to its welfare relevance through household consumption. Second, it extends the debate to MENA economies, a region still underrepresented in the empirical literature on the consumption effects of digital finance. Third, it shows that a quantile-based dynamic panel approach provides a more informative framework than mean-based models for identifying heterogeneous effects across the consumption distribution.

Overall, the study concludes that digital financial inclusion can support household consumption dynamics in MENA economies, but its effect is conditional, uneven, and closely linked to structural readiness. The results therefore support a cautious interpretation: expanding digital access alone is unlikely to generate uniform welfare gains unless it is accompanied by stronger digital infrastructure, effective institutional support, and a stable macroeconomic environment. Future research may extend this analysis by incorporating household-level microdata, richer measures of digital financial usage, and alternative identification strategies to further clarify the channels through which digital financial inclusion affects welfare in the region.

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