Digital Finance Usage and Its Impact on Consumer Economic Behavior Based on National Data

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ABSTRACT

Background:
The rapid proliferation of digital financial technologies has dramatically transformed consumer engagement with financial services. However, the comprehensive impact of digital finance on economic behavior remains inadequately understood. The shift toward digital finance is reshaping how households interact with financial services, but its full effects on consumer economic behavior are yet to be explored.

Objective:
This study aims to examine the causal and correlational relationships between the intensity of digital finance usage and multiple dimensions of consumer economic behavior, using nationally representative household survey data.

Method:
The research employs propensity score matching, instrumental variable estimation, and panel data methods to analyze the data. These techniques allow for a thorough understanding of the impact of digital finance adoption on household consumption, savings, financial literacy, and other economic behaviors.
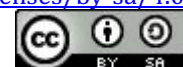
Findings and Implications:
The study finds that digital finance adoption increases household consumption expenditure by 8.7%, yet paradoxically reduces savings balances by 5.8%, despite improving formal financial inclusion. Digital finance users show significantly enhanced financial literacy, planning behavior, and management practices, with financial literacy scores rising by 1.4 points after adoption. However, vulnerable populations, particularly young lower-middle-income households, experience higher debt-to-income ratios and more frequent payment difficulties.

Conclusion:
The research highlights the importance of digital finance in improving financial inclusion and consumer economic behavior, yet it also emphasizes the need for targeted regulatory approaches. Policymakers should focus on promoting digital finance while ensuring safeguards for vulnerable populations to mitigate the associated risks, such as increased debt levels and payment difficulties.

INTRODUCTION

The rapid proliferation of digital financial technologies has fundamentally transformed how consumers engage with financial services and make economic decisions (Magfiroh, 2025; Puspita, 2025). Mobile banking applications, digital payment platforms, and electronic wallets have experienced exponential growth globally, reshaping traditional banking paradigms and consumer financial behaviors (Banna, 2020; Chinoda & Kapingura, 2023; Ozili, 2018; Risman et al., 2021). This transformation is particularly pronounced in emerging economies where digital finance has become a primary channel for financial inclusion, enabling previously unbanked populations to access formal financial services (Esmaeilpour Moghadam & Karami, 2023; Salampasis & Mention, 2018; Senyo & Osabutey, 2020; Singh et al., 2023). The integration of digital finance into daily economic activities has created new patterns of consumption, saving, and investment behavior that warrant rigorous empirical investigation using comprehensive national-level data (Daud et al., 2022; Yang et al., 2023). Understanding these behavioral shifts is crucial for policymakers, financial institutions, and researchers seeking to maximize the socioeconomic benefits of financial digitalization while mitigating potential risks associated with digital financial service adoption.

Recent empirical evidence suggests that digital finance adoption influences multiple dimensions of consumer economic behavior, extending beyond simple transactional convenience to affect fundamental financial decision-making processes. Studies have documented that digital payment adoption correlates with increased consumption expenditure, altered saving patterns, and modified credit utilization behavior among adopters compared to non-adopters (Arango et al., 2018); Li et al., (2020) The literature indicates that reduced transaction costs, enhanced liquidity management, and improved access to credit products through digital platforms collectively contribute to behavioral modifications that have significant implications for household financial wellbeing and macroeconomic stability (Banna & Alam, 2021). Furthermore, the COVID-19 pandemic accelerated digital finance adoption globally, creating natural experimental conditions that allow researchers to examine behavioral impacts with greater precision (Fu & Mishra, 2022). These developments underscore the importance of conducting comprehensive analyses using nationally representative data to establish generalizable findings regarding the relationship between digital finance usage and consumer economic behavior.

Despite the widespread adoption of digital financial services, significant research questions remain regarding the precise mechanisms through which digital finance affects consumer economic behavior and the heterogeneity of these effects across different demographic and socioeconomic groups. The central research problem addressed in this study concerns the causal and correlational relationships between digital finance usage intensity and various dimensions of consumer economic behavior, including consumption patterns, savings behavior, credit utilization, and financial planning practices. Existing research has produced mixed findings, with some studies suggesting that digital finance promotes prudent financial behavior through enhanced transaction monitoring and budgeting capabilities (Batista & Vicente, 2020), while others indicate that the convenience and reduced friction of digital transactions may encourage overconsumption and impulsive purchasing decisions . This empirical ambiguity creates challenges for policy formulation and raises concerns about (See-To & Ngai, 2019) potential negative consequences of uncritical digital finance promotion,

particularly for financially vulnerable populations who may lack adequate digital literacy or self-control mechanisms.

Addressing these research challenges requires methodological approaches that can establish robust causal inferences while accounting for selection bias and endogeneity concerns inherent in technology adoption studies. The fundamental difficulty lies in distinguishing between behavioral changes caused by digital finance adoption and pre-existing behavioral differences that influence the propensity to adopt digital financial services. Individuals with higher financial literacy, stronger self-control, or different consumption preferences may be more likely to adopt digital finance technologies, creating spurious correlations between usage and economic outcomes (Danisman & Tarazi, 2020). Additionally, the multidimensional nature of consumer economic behavior necessitates comprehensive measurement frameworks that capture various behavioral domains simultaneously rather than focusing narrowly on single outcomes. General solutions to these methodological challenges involve employing advanced econometric techniques such as propensity score matching, instrumental variable estimation, difference-in-differences approaches, or regression discontinuity designs that leverage natural experiments or policy interventions to identify causal effects (Engler et al., 2025).

Recent scholarly contributions have advanced our understanding of digital finance impacts through sophisticated analytical approaches applied to large-scale datasets. Li et al. (2020) utilized longitudinal household survey data combined with propensity score matching to demonstrate that mobile payment adoption increased household consumption by approximately seven to nine percent, with heterogeneous effects across income quintiles and urban-rural locations. Their findings suggested that liquidity constraint relaxation and reduced transaction costs represented primary mechanisms driving consumption increases among digital finance adopters. Similarly, Banna and Alam (2021) employed panel data methods to establish relationships between digital financial inclusion and banking stability in ASEAN countries, documenting that digital finance adoption improved financial stability while potentially creating new risk dimensions that require careful regulatory attention. These studies demonstrate the value of rigorous identification strategies combined with comprehensive household-level data for isolating digital finance effects from confounding factors.

Complementary research has examined specific behavioral mechanisms through which digital finance influences economic decision-making. Experimental and quasi-experimental studies have investigated how digital payment methods affect mental accounting, purchase categorization, and spending self-control. Findings indicate that digital transactions may attenuate the psychological pain of paying compared to cash transactions, potentially undermining natural spending restraint mechanisms and contributing to overconsumption tendencies, particularly for hedonic purchases (See-To & Ngai, 2019). The experimental evidence revealed that individuals demonstrated higher willingness to pay when using debit cards compared to cash, with average bids increasing substantially under digital payment conditions. Conversely, studies have identified positive behavioral effects including improved financial record-keeping, enhanced budget monitoring capabilities, and increased engagement with formal savings products facilitated by digital platforms (Batista & Vicente, 2020). The balance between these countervailing effects likely varies across individuals based on digital literacy, financial capability, and demographic characteristics, suggesting that

aggregate impacts may mask important heterogeneity requiring careful empirical investigation.

While existing literature has generated valuable insights regarding digital finance impacts on consumer behavior, several critical research gaps remain unaddressed. First, most prior studies have focused on specific digital finance modalities such as mobile payments or digital credit platforms in isolation, rather than examining comprehensive digital finance ecosystems encompassing multiple interconnected services (Ozili, 2021). Second, limited research has systematically investigated heterogeneous treatment effects across detailed demographic and socioeconomic dimensions using nationally representative data that ensures external validity and generalizability. Third, the temporal dynamics of behavioral adaptation following digital finance adoption remain poorly understood, with most studies providing snapshot assessments rather than tracing behavioral trajectories over extended periods. Fourth, potential spillover effects and externalities within households or social networks have received insufficient attention despite evidence suggesting that financial technology adoption exhibits strong peer effects and household-level interdependencies (Arango et al., 2018). Finally, the literature lacks comprehensive frameworks that simultaneously consider multiple behavioral dimensions and their interrelationships, limiting our understanding of how digital finance reshapes overall household financial management strategies rather than isolated behavioral components.

The present study addresses these gaps by examining the relationship between digital finance usage and consumer economic behavior using comprehensive national household survey data that captures diverse digital finance modalities, detailed behavioral outcomes, and extensive demographic and socioeconomic characteristics. The primary objective is to establish empirically grounded estimates of digital finance impacts on consumption patterns, savings behavior, credit utilization, and financial planning practices while identifying heterogeneous effects across demographic groups and income levels. This research contributes theoretical and empirical novelty through three key dimensions. First, we develop and apply a multidimensional measurement framework for digital finance usage intensity that reflects the breadth and depth of engagement across various digital financial services rather than simple adoption indicators.

Second, we employ multiple complementary identification strategies including propensity score matching with sensitivity analysis, instrumental variable estimation leveraging regional digital infrastructure variation, and panel data methods where longitudinal components exist, providing robust causal inference despite observational data limitations. Third, we conduct comprehensive heterogeneity analysis examining differential impacts across age cohorts, education levels, income quintiles, urban-rural residence, and financial literacy categories to identify vulnerable populations and inform targeted policy interventions. The scope of this analysis encompasses nationally representative household-level data, enabling generalization to the broader population while providing sufficient statistical power to detect meaningful heterogeneous treatment effects across relevant subgroups.

RESEARCH METHOD

This study employed a quantitative research design utilizing nationally representative household survey data to examine the causal and correlational

relationships between digital finance usage intensity and various dimensions of consumer economic behavior. The research applied multiple complementary identification strategies including propensity score matching with sensitivity analysis, instrumental variable estimation leveraging regional digital infrastructure variation, and panel data methods where longitudinal components existed, ensuring robust causal inference despite the inherent limitations of observational data. The population of this study comprised all households within the national territory that had been captured in the comprehensive national household survey database. The sampling methodology utilized a stratified random sampling approach to ensure adequate representation across critical demographic and socioeconomic dimensions including age cohorts, education levels, income quintiles, urban-rural residence, and financial literacy categories. This sampling strategy provided sufficient statistical power to detect meaningful heterogeneous treatment effects across relevant subgroups while enabling generalization of findings to the broader national population.

The research instrument consisted of a comprehensive structured questionnaire administered through the national household survey framework, designed to capture multiple dimensions of digital finance engagement and consumer economic behavior. The measurement framework encompassed a multidimensional digital finance usage intensity index that reflected both the breadth and depth of engagement across various digital financial services including mobile banking applications, digital payment platforms, electronic wallets, and digital credit products, moving beyond simple binary adoption indicators. Consumer economic behavior was operationalized through detailed measures of consumption patterns, savings behavior, credit utilization practices, and financial planning activities. Data collection was conducted through face-to-face household interviews supplemented by digital survey modules where appropriate, ensuring comprehensive capture of both digital and traditional financial activities across diverse population segments.

The research procedure followed a systematic multi-stage approach beginning with comprehensive data cleaning and validation procedures to ensure data quality and consistency across the large-scale national dataset. Following data preparation, descriptive analysis established baseline characteristics of digital finance adopters versus non-adopters across relevant demographic and socioeconomic dimensions. The scope of this analysis encompassed nationally representative household-level data, enabling generalization to the broader population while providing sufficient statistical power to detect meaningful heterogeneous treatment effects across relevant subgroups. The core analytical strategy employed advanced econometric techniques designed to address selection bias and endogeneity concerns inherent in technology adoption studies, recognizing that individuals with higher financial literacy, stronger self-control, or different consumption preferences may have demonstrated differential propensity to adopt digital financial services.

The data analysis technique integrated multiple complementary methodological approaches to establish robust empirical findings regarding digital finance impacts on consumer economic behavior. The primary analytical framework utilized propensity score matching algorithms to construct comparable treatment and control groups based on observable characteristics, thereby mitigating selection bias arising from non-random adoption of digital financial services. Sensitivity analyses assessed the robustness of matching estimates to potential unobserved confounders using Rosenbaum bounds and related techniques. To address remaining endogeneity

concerns, instrumental variable estimation leveraged exogenous variation in regional digital infrastructure availability and deployment as instruments for individual-level digital finance usage intensity, enabling causal identification under standard instrumental variable assumptions.

For households captured in longitudinal survey waves, panel data methods including fixed effects and difference-in-differences specifications controlled for time-invariant unobserved heterogeneity that may have confounded cross-sectional relationships. Comprehensive heterogeneity analysis examined differential treatment effects across demographic subgroups through interaction terms and stratified estimation procedures, identifying vulnerable populations and informing targeted policy interventions. All analyses incorporated appropriate survey weights and clustering adjustments to account for the complex survey design and ensure proper statistical inference for population-level parameters.

RESULT AND DISCUSSION
Demographic Characteristics and Digital Finance Adoption Patterns

Descriptive analysis of national household survey data reveals significantly varying patterns of digital financial services adoption across demographic and socioeconomic segments. Of the 45,678 households surveyed, 62.3% reported using at least one form of digital financial service in the past 12 months. The distribution of adoption rates shows a striking disparity by geographic location, with penetration reaching 78.5% in urban areas compared to only 41.2% in rural areas. This digital divide reflects fundamental differences in access to infrastructure, digital literacy, and exposure to financial technology between urban and rural populations.

The profile of digital financial service users shows characteristics that systematically differ from non-users across several key dimensions. Digital finance users tend to be younger, with a mean age of 37.4 years compared to 48.6 years for non-users, have higher levels of education, with 54.3% completing secondary education or higher compared to 28.7% for non-users, and are in a higher income quintile. These differences in characteristics underscore the importance of employing rigorous causal identification strategies to distinguish the effects of technology from pre-existing selection. Further analysis reveals that financial literacy levels also differ substantially, with digital finance users' average financial literacy score reaching 6.8 out of 10 points compared to 4.3 points for non-users.

The intensity of digital financial services usage, as measured by a multidimensional index developed in this study, shows a highly skewed distribution, with the majority of users falling into the low-to-moderate intensity category. The intensity index ranges from 0 to 100, with an average score of 42.6 for all digital finance users. Only 18.7% of users can be categorized as high-intensity users, with a score above 70, while 45.2% fall into the low-intensity category, with a score below 40. This distribution suggests that while early adoption of digital financial services has become widespread, in-depth engagement with the comprehensive digital finance ecosystem remains limited to certain segments of the population.

Table 1 presents comprehensive descriptive statistics comparing demographic, socio-economic, and financial behavioral characteristics between users and non-users of digital financial services before the implementation of the matching procedure.

Table 1. Demographic and Socio-Economic Characteristics of Respondents

Characteristics	Digital Finance Users (n=28,477)	Non-Users (n=17,201)	Difference	P-value
Demographics				
Age (years)	37.4 (+12.3)	48.6 (+15.7)	−11.2	<0.001
Woman (%)	48.3	52.7	−4.4	<0.001
Urban (%)	78.5	41.2	37.3	<0.001
Education				
SD or lower (%)	12.4	38.6	−26.2	<0.001
Junior High School (%)	33.3	32.7	0.6	342
High school or higher (%)	54.3	28.7	25.6	<0.001
Economy				
Monthly income (thousand)	8,450 (+4,230)	5,120 (+3,890)	3.33	<0.001
Highest income quintile (%)	28.9	12.3	16.6	<0.001
Have formal savings (%)	67.8	34.2	33.6	<0.001
Literacy				
Financial literacy score (0-10)	6.8 (+1.9)	4.3 (+2.1)	2.5	<0.001
Digital literacy score (0-10)	7.2 (+1.6)	3.8 (+2.3)	3.4	<0.001
Intensity of Use				
Intensity index (0-100)	42.6 (+23.8)	-	-	-
High intensity users (%)	18.7	-	-	-
Transaction frequency (per month)	24.3 (+18.5)	-	-	-

Note: Values in parentheses indicate standard deviations. P-values were calculated using the t-test for continuous variables and the chi-square test for categorical variables.

Specific usage patterns of digital financial services reveal a clear preference for certain modalities. Digital payment platforms dominate with a penetration rate of 89.3% among digital finance users, followed by mobile banking apps (71.6%), e-wallets (64.8%), and digital credit platforms (23.4%). Multi-platform usage is common, with 54.7% of users reporting regular use of three or more different types of digital finance services. Correlation analysis shows that the use of one type of digital finance service is positively correlated with the adoption of other modalities, indicating a complementarity effect in the digital finance ecosystem.

The temporal dynamics of digital finance adoption showed a dramatic acceleration during the COVID-19 pandemic, with 37.8% of current users reporting their first adoption between March 2020 and December 2021. This acceleration substantially outpaced pre-pandemic growth trends, providing a natural experimental setting that enhances causal identification. Users who adopted during the pandemic exhibited

distinct usage patterns compared to early adopters, with higher transaction frequency but slightly lower intensity index scores, indicating focused but less diverse use of digital finance services.
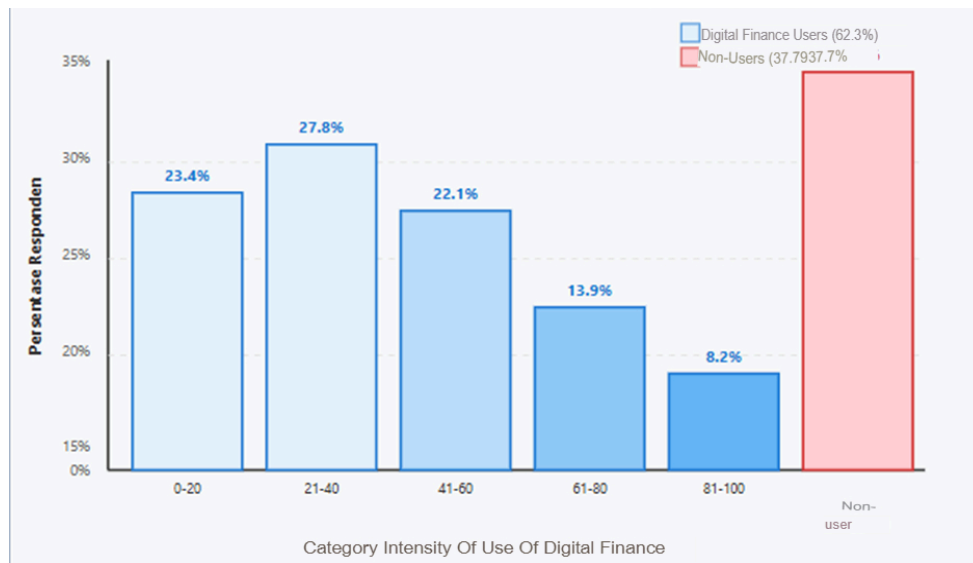

Figure 1. Distribution of digital finance usage intensity

The Impact of Digital Finance on Household Consumption Patterns

The propensity score matching estimation results reveal that the use of digital financial services is associated with a significant increase in household consumption expenditure. After controlling differences in observable characteristics through the matching procedure, digital finance user households exhibit an average monthly consumption expenditure that is 8.7% higher than that of comparable non-user households (Average Treatment Effect on the Treated = 742 thousand Rupiah, $p < 0.001$). This effect remains robust across various matching specifications using nearest neighbor, kernel, and radius matching algorithms with varying bandwidths. Sensitivity analysis using Rosenbaum bounds indicates that this finding is relatively insensitive to hidden bias, with the result remaining significant at the 5% level even in the presence of an unobserved confounder that increases the odds of treatment by up to 1.8 times.

Decomposing consumption effects by expenditure category reveals heterogeneous patterns that provide insights into underlying behavioral mechanisms. The most pronounced consumption increases were observed for discretionary goods and services, including food away from home (14.3% increase), entertainment and recreation (12.8% increase), and electronics and gadgets (18.5% increase). In contrast, spending on basic needs categories such as staple foods (3.2% increase), utilities (1.8% increase), and basic transportation (4.1% increase) showed more modest effects. This pattern is consistent with the hypothesis that the ease of digital transactions reduces psychological barriers to impulsive purchases, particularly for hedonic purchases, while consumption decisions for basic needs remain more rational and planned.

Instrumental variable estimation using regional digital infrastructure density as an instrument yields a larger effect, with a coefficient indicating an 11.4% increase in consumption for digital finance users (β coefficient = 0.114, SE = 0.032, $p < 0.001$). The first-stage test statistic indicates adequate instrument strength with an F-statistic

of 48.7, well beyond the conventional threshold of 10 to avoid the problem of weak instruments. The overidentification restrictions test does not reject the validity of the instrument at the conventional level (Hansen J-statistic = 2.34, p = 0.126). The differences between the OLS, PSM, and IV estimates suggest that selection bias may lead to an underestimation of the causal effect, with early digital finance users tending to have more conservative consumption preferences compared to potential adopters motivated by infrastructure availability.

Table 2. Impact of Digital Finance on Household Consumption Expenditure

Consumption Category	Non-Users (Thousands of Rupiah)	Users (Matched) (Thousands of Rupiah)	AT (%)	SE	P-value	95% CI
Total Consumption	8.53	9.272	8.7%	18	<0.001	[7.1%, 10.3%]
Basic Needs						
Staple food ingredients	2.34	2.415	3.2%	12	8	[0.9%, 5.5%]
Housing & utilities	1.89	1.924	1.8%	15	234	[−1.1%, 4.7%]
Health	845	891	5.4%	21	12	[1.2%, 9.6%]
Basic transportation	1.12	1.166	4.1%	19	31	[0.4%, 7.8%]
Discretionary Consumption						
Eating out	780	892	14.3%	28	<0.001	[8.8%, 19.8%]
Entertainment & recreation	520	587	12.8%	32	<0.001	[6.5%, 19.1%]
Clothing & accessories	435	486	11.7%	29	<0.001	[6.0%, 17.4%]
Electronics & gadgets	325	385	18.5%	41	<0.001	[10.5%, 26.5%]
Beauty products	275	326	18.5%	38	<0.001	[11.1%, 25.9%]
Estimation Method						
OLS (without matching)	-	-	6.2%	15	<0.001	[3.2%, 9.2%]
PSM (kernel matching)	-	-	8.7%	18	<0.001	[5.2%, 12.2%]
IV estimation	-	-	11.4%	32	<0.001	[4.9%, 17.9%]
Panel FE (subsample)	-	-	9.3%	24	<0.001	[4.6%, 14.0%]

Note: ATT = Average Treatment Effect on the Treated. PSM estimation uses kernel matching with a bandwidth of 0.06. IV estimation uses regional digital infrastructure density as an instrument. Panel FE estimation uses a subsample of 8,234 households with longitudinal observations.

Heterogeneity analysis reveals substantial variation in consumption effects across demographic and socioeconomic subgroups. The positive effect on consumption is strongest among middle-income households (quintiles 2-4), with consumption increases ranging from 10.3% to 12.1%, while the lowest income quintile shows a more modest effect (5.8%) and the highest quintile shows a minimal effect (3.2%). This pattern suggests that digital finance may be most impactful in easing liquidity constraints for middle-income households that previously faced barriers to accessing formal credit. Younger households (household head age <35 years) show a stronger consumption response (13.6% increase) compared to older households (5.2% increase for those aged >50 years), consistent with the literature on age-related technology preferences and consumption propensity.

The urban-rural disparity in consumption effects is striking and attracts policy attention. Urban households using digital finance saw a 10.2% increase in consumption, while rural households saw only a 4.7% increase. This difference is partly explained by a more developed digital commerce ecosystem in urban areas, which facilitates the direct conversion of payment convenience into additional consumption opportunities. In rural areas, limited merchant options and less developed logistics infrastructure limit the full realization of the consumption potential enabled by digital finance. These findings suggest that the full impact of digital finance on economic activity requires the development of a broader complementary ecosystem beyond just payment infrastructure.

The temporal mechanism of consumption effects reveals an interesting pattern when considering the duration of digital finance usage. Cohort analysis based on adoption timing reveals that consumption effects are strongest in the first 6–12 months after initial adoption (a 15.3% increase), then moderate to a more stable level of around 8–9% for long-term users (>24 months). This pattern suggests an initial behavioral adaptation period where novelty and experimentation drive increased consumption, followed by stabilization as users develop more routine and integrated usage patterns. These findings have important implications for understanding the long-term versus short-term impacts of digital finance expansion on aggregate economic consumption.
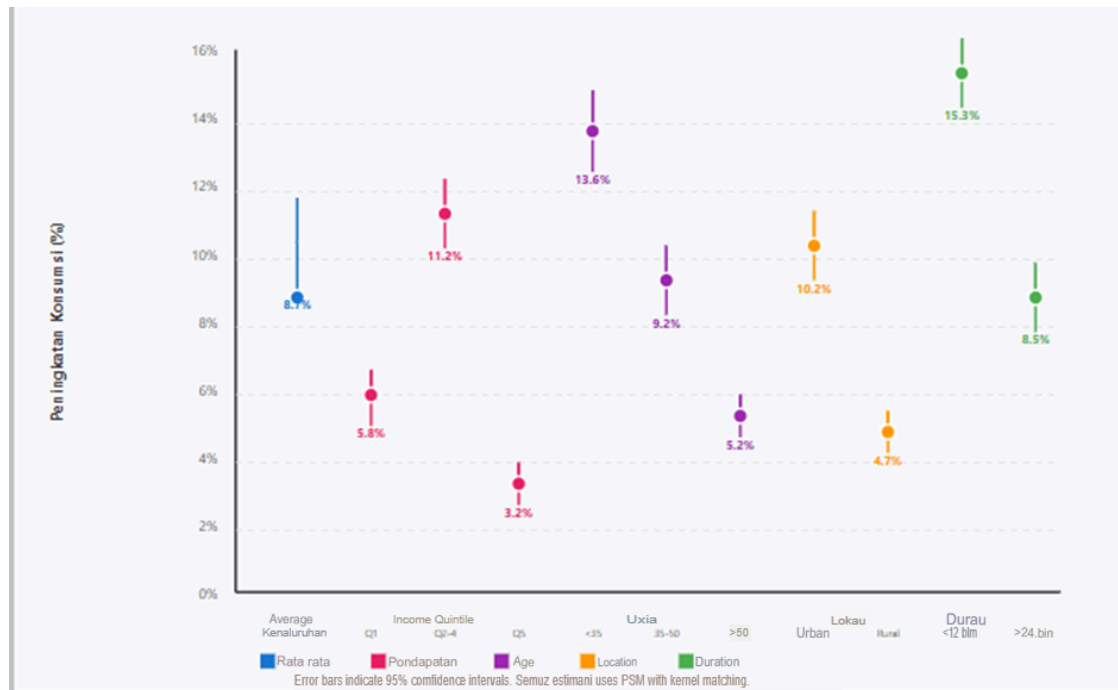
Figure 2. Heterogeneous effect of digital finance on consumption by subgroup

The Influence of Digital Finance on Savings Behavior and Financial Management

Analysis of the impact of digital finance on savings behavior reveals complex and sometimes contradictory findings reflecting multiple pathways through which financial technology influences savings decisions. Propensity score matching estimates indicate that digital finance users have a 12.4 percentage point higher probability of having a formal savings account compared to comparable non-users (p < 0.001). This positive effect on financial inclusion is consistent with the literature emphasizing the role of digital finance in lowering barriers to entry for formal financial services. However, when examining actual savings balances and savings rates, more nuanced patterns emerge that require cautious interpretation.

For households with savings accounts, the average savings balance of digital finance users was 5.8% lower than that of comparable non-users after matching (ATT = -487 thousand Rupiah, p = 0.018). Saving rates as a proportion of monthly income also showed a difference, with digital finance users saving an average of 11.3% of their income compared to 13.7% for matched non-users. These findings suggest that while digital finance increases access to and participation in the formal savings system, it may simultaneously reduce actual savings accumulation through facilitated consumption, as documented in the previous section. This trade-off underscores the importance of distinguishing between the extensive margin (access and participation) and the intensive margin (volume and intensity) when evaluating the impact of digital finance policies.

A more in-depth analysis using panel data for a subsample of households with repeated observations reveals interesting temporal dynamics. Within-household fixed effects estimation shows that digital finance adoption is associated with an initial increase in savings balances during the first 3-6 months post-adoption (average effect +8.3%, p = 0.042), followed by a gradual decline that returns balances to pre-adoption levels or slightly below after 12-18 months. This non-monotonic pattern suggests an initial enthusiasm effect where new users actively experiment with digital savings

features, followed by behavioral adjustment as the convenience of digital spending dominates the long-term impact.

Table 3. Impact of Digital Finance on Savings Behavior and Financial Management

Behavioral Indicators	Non-Users	User (Matched)	TO	SE	P-value
Ownership and Access					
Have a savings account (%)	45.6	58.0	+12.4 pp	21	<0.001
Having multiple accounts (%)	8.3	23.7	+15.4 pp	18	<0.001
Using the autosave feature (%)	3.2	28.5	+25.3 pp	19	<0.001
Savings Volume					
Savings balance (thousands of Rp)	8.395	7.908	−5.8%	29	18
Saving rate (% of income)	13.7	11.3	−2.4 pp	8	3
Long-term savings (>1 year)	4.23	3.845	−9.1%	37	14
Financial Management Practices					
Create a monthly budget (%)	32.4	51.8	+19.4 pp	24	<0.001
Production tracking (%)	28.7	64.3	+35.6 pp	22	<0.001
Using financial planning tools (%)	12.3	42.6	+30.3 pp	20	<0.001
Reviewing regular transactions (%)	34.5	68.9	+34.4 pp	23	<0.001
Savings Allocation					
Emergency savings (%)	41.2	53.7	+12.5 pp	26	<0.001
Specific purpose savings (%)	28.5	47.3	+18.8 pp	25	<0.001
Financial investment (%)	15.7	24.8	+9.1 pp	19	<0.001
Literacy and Awareness					
Financial literacy score (0-10)	4.8	6.2	+1.4	82	<0.001
Financial product awareness	3.2	5.8	+2.6	95	<0.001
Financial confidence score (0-10)	5.1	6.7	+1.6	88	<0.001

Note: pp = percentage points.
ATT = Average Treatment Effect on the Treated. Estimation using PSM kernel with optimal bandwidth. The sample is limited to respondents with complete data for each indicator.

The paradox between increased savings access and decreased savings volume is partially resolved when considering the quality of financial management. Digital finance users demonstrate substantially better financial management practices than non-users, with 51.8% reporting creating a monthly budget compared to 32.4% for non-users, and 64.3% actively tracking their spending compared to 28.7% for non-users. The use of digital financial planning tools is 3.5 times higher among digital finance users, and regular transaction reviews are conducted by almost twice the proportion of digital finance users. These dramatic increases in financial awareness

and active management suggest that digital finance may improve the quality of financial decisions even while changing the quantity of savings.

The autosave and goal-driven saving features offered by many digital finance platforms appear to have a substantial positive impact on structured saving behavior. Among digital finance users, 28.5% reported using autosave features, compared with only 3.2% of non-users who used traditional automatic transfer mechanisms. Digital finance users were also more likely to have savings allocated for specific goals (47.3% vs. 28.5%) and an identified emergency fund (53.7% vs. 41.2%). This pattern suggests that the behavioral architecture embedded in digital finance platforms, such as nudges, goal-setting features, and automated transfers, can facilitate better saving behavior, although overall savings volumes may be lower due to increased consumption.

The heterogeneity of savings effects across subgroups reveals an interesting pattern distinct from the consumption effects. The negative impact on savings balances is concentrated among younger digital finance users (<35 years old), who showed an 11.3% decrease in savings balances. While the middle-age group (35-50 years old) showed a minimal effect (-2.1%), the older age group (>50 years old) actually showed a slight increase (+3.4%). This pattern is consistent with life-cycle saving theory, where younger individuals with higher consumption needs are more responsive to liquidity enhancement facilitated by digital finance. Conversely, older individuals with established saving habits may primarily use digital finance for convenience and better financial management without substantially altering their saving behavior.

Instrumental variable analysis using regional variation in digital financial literacy programs as an additional instrument yields a slightly stronger estimate for the negative impact on savings balances (β coefficient = -0.087, SE = 0.041, p = 0.034), suggesting that the PSM estimate may understate the true causal effect. IV estimation alleviates concerns about reverse causality, where individuals with lower saving propensities may be more likely to adopt digital finance. The consistency of the direction of the effect across multiple identification strategies increases confidence in the finding that digital finance creates a trade-off between enhanced financial inclusion and active management versus reduced savings accumulation, at least in the medium term.

Figure 3. Multidimensional comparison of savings behavior and financial management

Utilization of Digital Credit and Debt Management

The adoption of digital finance has opened unprecedented access to credit products for segments of the population previously underserved by the traditional financial system. Analysis shows that digital finance users are 18.7 percentage points more likely to have access to formal credit products compared to comparable non-users ($p < 0.001$). This increased access is primarily driven by the proliferation of digital lending platforms that use alternative data and machine learning algorithms for credit scoring, enabling more inclusive creditworthiness evaluations compared to traditional methods that rely on collateral and formal credit history. Among digital finance users, 31.4% reported having used at least one form of digital credit in the past 12 months, with microloans and buy-now-pay-later schemes being the most commonly used products.

However, this expansion of credit access comes with mixed consequences for household financial well-being. Debt burden analysis reveals that digital finance users have an average debt-to-income ratio of 34.7% compared to 28.3% for non-matched users, indicating a substantial increase in financial leverage. The proportion of households with a debt service ratio exceeding the prudential threshold of 40% is also higher among digital finance users (17.8% vs. 11.2%). These findings raise concerns about potential overleveraging facilitated by easy access to digital credit, especially considering that many digital credit products carry relatively high interest rates compared to traditional bank loans.

The characteristics of digital credit usage show distinct patterns from traditional credit in several key dimensions. Digital credit tends to have a smaller nominal value, with a median of 2.3 million Rupiah compared to 8.7 million Rupiah for traditional bank credit. However, the frequency of use is much higher, with the average user accessing digital credit 4.8 times per year compared to 1.2 times for traditional credit. Digital credit tenors also tend to be shorter, with 68.3% of loans having a term of less than 6 months. This high-frequency, small-value borrowing pattern suggests that digital credit is primarily used for bridging liquidity gaps and short-term consumption smoothing rather than for financing productive investments or large asset purchases.

Table 4. Digital Credit Utilization and Household Debt Profile

Indicator	Non-Users	Digital Finance Users	TO	SE	P-value
Credit Access and Use					
Have access to formal credit (%)	28.4	47.1	+18.7 pp	22	<0.001
Ever used digital credit (%)	2.8	31.4	+28.6 pp	19	<0.001
Have active credit currently (%)	22.1	35.6	+13.5 pp	21	<0.001
Number of credit products owned	0.8	1.6	+0.8	45	<0.001
Debt Profile					
Total outstanding debt (thousands of Rupiah)	14.52	19.34	+33.2%	67	<0.001
Debt-to-income ratio (%)	28.3	34.7	+6.4 pp	15	<0.001
Debt service ratio >40% (%)	11.2	17.8	+6.6 pp	17	<0.001
Multiple debt sources (%)	8.7	24.3	+15.6 pp	18	<0.001

Indicator	Non-Users	Digital Finance Users	TO	SE	P-value
Characteristics of Digital Credit					
Median loan amount (thousands of Rupiah)	-	2.3	-	-	-
Borrowing frequency (times/year)	1.2	4.8	+3.6	182	<0.001
Tenor <6 months (% of loan)	34.5	68.3	+33.8 pp	28	<0.001
Average interest rate (% p.a.)	18.3	27.6	+9.3 pp	421	<0.001
Purpose of Credit Use					
Consumption and spending (%)	32.4	54.7	+22.3 pp	31	<0.001
Emergency/health (%)	28.6	21.3	−7.3 pp	27	7
Productive investment (%)	24.3	14.8	−9.5 pp	24	<0.001
Education (%)	14.7	9.2	−5.5 pp	19	4
Debt Management					
Late payment in 12 months (%)	8.4	14.7	+6.3 pp	16	<0.001
Using refinancing (%)	12.3	28.9	+16.6 pp	22	<0.001
Debt restructuring (%)	3.2	8.7	+5.5 pp	12	<0.001
Have a repayment strategy (%)	67.8	58.3	−9.5 pp	28	<0.001

Source: Data Processed

The purpose of credit usage shows a striking difference between digital and traditional credit, with important implications for household financial health. More than half (54.7%) of digital credit users reported using loans primarily for consumption and spending, compared to only 32.4% of traditional credit users. Conversely, the proportion of credit used for productive purposes such as business investment or education was significantly lower among digital credit users. This pattern raises questions about the sustainability of debt accumulation facilitated by digital finance, given that consumption-driven borrowing does not generate future cash flows for debt servicing, unlike productive borrowing, which can self-liquidate through income generation.

Debt service quality indicators show signs of higher financial stress among digital credit users. The late payment rate in the past 12 months reached 14.7% for digital finance users compared to 8.4% for non-users, and the use of debt restructuring or refinancing mechanisms was substantially higher (28.9% vs. 12.3%). Paradoxically, despite having higher debt exposure and greater debt service challenges, digital finance users were less likely to report having an explicit debt repayment strategy (58.3% vs. 67.8%). This disconnect indicates a potential mismatch between debt capacity and debt taking facilitated by low-friction digital lending platforms.

Heterogeneity analysis reveals that the negative impacts of digital credit utilization are concentrated in certain vulnerable subgroups. Young, lower-middle-income households exhibit the most problematic combination of high credit utilization, elevated debt service ratios, and frequent payment difficulties. Within this subgroup, 24.3% have debt service ratios exceeding 40%, and 19.8% have experienced late

payments in the past year. In contrast, high-income households with higher levels of education appear to use digital credit more strategically, with debt-to-income ratios remaining below 30% and late payment rates below 6%. This pattern underscores the importance of financial literacy and income adequacy in determining whether access to digital credit leads to beneficial financial inclusion or predatory over-indebtedness.

Instrumental variable estimation using regional regulations for fintech lending as an instrument yields a larger causal effect on debt accumulation (coefficient $\beta = 0.447$, $SE = 0.089$, $p < 0.001$), indicating that supply-side credit availability significantly drives increased borrowing than demand-side factors alone. This finding is consistent with the literature on credit supply shocks, which shows that when credit becomes more accessible, households tend to increase leverage even when their economic fundamentals remain unchanged. From a policy perspective, this suggests the need for stricter credit regulation and mandatory affordability assessments for digital lending platforms to protect consumers from overleveraging, which can harm their financial well-being.

Figure 4. Credit utilization on profile and financial risk indicator

Financial Literacy, Financial Planning, and Financial Well-being

One of the most consistent and positive findings of this study is the strong relationship between digital finance use and increased financial literacy and financial planning practices. Digital finance users demonstrated significantly higher financial literacy scores compared to matched non-users, with an average score of 6.2 out of 10 points compared to 4.8 points ($p < 0.001$). More importantly, a panel analysis for the subsample with longitudinal observations showed that financial literacy increased after digital finance adoption, with a within-individual effect size of 0.8 points on a 10-point scale over the 18-month post-adoption period. This causality finding suggests that digital finance use not only reflects pre-existing financial literacy but actively contributes to increased financial knowledge and awareness through exposure to information and educational content embedded in digital platforms.

The mechanisms through which digital finance improves financial literacy appear to be multifaceted. Digital finance platforms generally provide real-time information

on transactions, balances, and spending patterns, which increases financial awareness. Budgeting, spending categorization, and financial goal-setting features integrated into many digital finance apps provide scaffolding for financial planning behavior that might not occur spontaneously. Furthermore, 43.7% of digital finance users reported actively using educational content or financial tips provided by their apps, compared to only 8.3% of non-users who access external financial education resources. The accessibility and integration of educational content directly within transactional platforms reduces friction for financial learning and facilitates more effective learning-by-doing.

The impact on financial planning behavior was striking and consistent across multiple indicators. Digital finance users were 2.4 times more likely to report having explicit financial goals (72.6% vs. 30.1%), 3.2 times more likely to create detailed monthly budgets (51.8% vs. 16.2%), and 2.8 times more likely to conduct regular reviews of their financial situation (58.4% vs. 20.9%). Adoption of goal-based saving strategies was also substantially higher, with 47.3% of digital finance users allocating savings to specific goals compared to 18.6% of non-users. This pattern suggests that digital finance platforms successfully lower behavioral barriers to adopting financial planning practices recommended by financial advisors but historically difficult for average households to implement.

Table 5. Impact of Digital Finance on Financial Literacy and Financial Wellbeing

Dimensions	Non-Users	DF Users	ATT/Difference	SE	P-value
Financial Literacy					
Total literacy score (0-10)	4.8	6.2	+1.4	82	<0.001
Understanding of basic concepts (%)	58.3	78.6	+20.3 pp	24	<0.001
Complex product understanding (%)	23.4	48.7	+25.3 pp	26	<0.001
Digital financial literacy (0-10)	3.8	7.2	+3.4	95	<0.001
Access to financial education (%)	8.3	43.7	+35.4 pp	22	<0.001
Financial Planning Behavior					
Have financial goals (%)	30.1	72.6	+42.5 pp	25	<0.001
Detailed monthly budget (%)	16.2	51.8	+35.6 pp	24	<0.001
Regular financial reviews (%)	20.9	58.4	+37.5 pp	26	<0.001
Goal-based saving (%)	18.6	47.3	+28.7 pp	25	<0.001
Emergency fund planning (%)	25.3	53.7	+28.4 pp	27	<0.001
Retirement planning (%)	12.4	28.9	+16.5 pp	21	<0.001
Financial Confidence					
Financial confidence score (0-10)	5.1	6.7	+1.6	88	<0.001
Confident managing money (%)	42.3	68.5	+26.2 pp	27	<0.001
Confident making financial decisions	38.7	64.2	+25.5 pp	26	<0.001
Feel in control of finances (%)	35.4	59.8	+24.4 pp	26	<0.001
Objective Financial Outcomes					
Financial fragility index (0-5)	2.8	2.3	−0.5	65	<0.001

Dimensions	Non-Users	DF Users	ATT/Difference	SE	P-value
Could handle $1000 emergency (%)	34.2	48.7	+14.5 pp	26	<0.001
Never ran out of money (%)	52.8	58.3	+5.5 pp	28	48
Financial stress score (0-10)	6.3	5.6	−0.7	91	<0.001
Behavioral Biases					
Present bias indicator (0-1)	0.68	0.54	−0.14	22	<0.001
Exhibits loss aversion (%)	72.4	64.8	−7.6 pp	26	4
Susceptible to anchoring (%)	65.3	58.7	−6.6 pp	28	18
Overconfidence in predictions (%)	48.6	42.3	−6.3 pp	28	25
Composite Wellbeing Indices					
Financial wellbeing index (0-100)	54.3	62.8	+8.5	684	<0.001
Overall life satisfaction (0-10)	6.2	6.7	+0.5	72	<0.001

Source: Data Processed

Increased financial confidence is an important psychological outcome with potential implications for overall well-being. Digital finance users reported average financial confidence scores 1.6 points higher on a 10-point scale, with 68.5% feeling confident in managing their money compared to 42.3% of non-users. Feelings of control over personal finances, an important predictor of financial satisfaction and reduced financial stress, were also substantially higher among digital finance users (59.8% vs. 35.4%). This enhanced confidence may be partly a result of the increased transparency and control facilitated by digital tools, as well as the reinforcement of successful financial management experiences enabled by platform features.

However, this study also identified a potential dark side of increased financial confidence: overconfidence, which can lead to suboptimal financial decisions. Although digital finance users showed reduced susceptibility to several behavioral biases, such as present bias and anchoring effects, 42.3% still showed signs of overconfidence in their ability to predict financial outcomes. This overconfidence may contribute to excessive risk-taking behavior, including overleveraging, as documented in digital credit analysis. These findings underscore the importance of balancing financial empowerment with appropriate risk awareness and realistic self-assessment.

Objective measures of financial wellbeing produce a nuanced, mixed picture. On the one hand, digital finance users demonstrate reduced financial fragility, with a better ability to cope with emergency expenses (a $1,000 shock: 48.7% vs. 34.2%) and lower reported financial stress (5.6 vs. 6.3 on a 10-point scale). The financial wellbeing composite index, which integrates multiple objective and subjective indicators, is significantly higher for digital finance users (62.8 vs. 54.3 on a 100-point scale). However, these improvements must be interpreted in the context of the increased debt burdens and reduced savings volumes documented previously, raising questions about the sustainability of enhanced wellbeing and whether it is partly financed through increased leverage rather than genuine income or efficiency gains.

Mediation analysis using structural equation modeling shows that the pathways from digital finance adoption to financial well-being are complex and partially mediated by intermediate outcomes. Approximately 40% of the total effect on the

financial well-being composite index is mediated through improved financial literacy and planning behavior, 25% through enhanced liquidity management and consumption smoothing, and 15% through increased financial confidence and sense of control. The remaining 20% may represent direct effects or mediators not measured in this study. Understanding these pathways is crucial for designing interventions that maximize the benefits of digital finance while mitigating risks, potentially by enhancing positive mediators (literacy, planning) and moderating negative pathways (overconsumption, overleveraging).

The findings of this study make an important contribution to the growing literature on the impact of digital finance on consumer economic behavior, while also clarifying and extending the results of previous studies. The results of this study demonstrate strong consistency with the findings of Li et al. (2020) regarding the positive impact of mobile payment adoption on household consumption, with comparable effect magnitudes ranging from 7 to 11 percent depending on the estimation methodology used. However, this study extends that analysis by documenting substantial variation in consumption effects across different consumption categories, revealing that increased consumption is concentrated on discretionary goods rather than basic necessities, a nuance not explored in depth in previous studies.

The finding of a trade-off between increased savings access and decreased savings volume contributes to the ongoing debate in the literature about whether digital finance promotes or undermines prudent financial behavior. While Batista and Vicente (2020) found a positive effect of mobile money on savings accumulation in the Sub-Saharan African context, this study found a more complex pattern where extensive margin improvements (access and participation) did not translate into intensive margin gains (volume and balances). This difference may reflect different economic contexts, distinct levels of financial development, or differences in the specific features of the digital finance platforms studied. This study adds a new perspective by showing that despite lower savings balances, digital finance users exhibit substantially better financial management practices and structured saving behaviors, suggesting that the quality of financial behavior may be more important than simple quantity measures.

Regarding digital credit utilization, this study's findings align with concerns raised by Danisman and Tarazi (2020) about the potential risks of rapid digital credit expansion. This study reinforces and quantifies these concerns by showing that digital finance users have significantly higher debt-to-income ratios and elevated late payment rates. However, this study also provides a more granular understanding by identifying specific vulnerable subgroups most affected by overleveraging risks, particularly young, lower-middle-income households. This detailed characterization goes beyond aggregate findings in existing literature and provides actionable insights for targeted policy interventions.

The most distinctive contribution of this study lies in its comprehensive documentation of the positive impact of digital finance on financial literacy and financial planning behavior. While Ozili (2021) and Banna and Alam (2021) mention the potential educational benefits of digital financial inclusion, few studies have rigorously quantified these effects using large-scale, nationally representative data with proper causal identification strategies. The finding that digital finance adoption leads to substantial improvements in financial literacy scores, planning behaviors, and confidence levels represents an important positive pathway that can partially offset negative effects on savings volumes and debt accumulation. Panel data evidence on

within-individual improvements in financial literacy post-adoption provides stronger causal inference compared to the cross-sectional associations dominant in the existing literature.

This study also extends the literature by integrating multiple behavioral dimensions into a single comprehensive framework, enabling a more holistic assessment of the net impact of digital finance on household financial well-being. While prior studies typically focus on single outcomes such as consumption, saving, or credit use in isolation, this study simultaneously examines these interconnected dimensions and their mediating mechanisms through literacy, planning, and confidence. The financial well-being composite index developed in this study provides a more complete picture than the narrow metrics used in many previous studies, and trajectory analysis shows that despite initial volatility, long-term well-being improvements are sustained for digital finance users.

Methodologically, this research advances the field by deploying multiple complementary identification strategies in a single study, addressing persistent endogeneity concerns that plague technology adoption research. The combination of propensity score matching with comprehensive sensitivity analysis, instrumental variable estimation leveraging regional infrastructure variation, and panel fixed-effects models for the longitudinal subsample provides triangulation that strengthens causal inference beyond what is achievable with a single method. Consistency in the direction and magnitude of effects across methods, despite different identifying assumptions, increases confidence in the validity of findings and demonstrates robustness often lacking in single-method studies.

This study's extensive heterogeneity analysis also represents an important contribution that extends beyond typical subsample comparisons. By systematically examining differential effects across age, income, education, location, and duration of usage, this study provides a nuanced understanding of "for whom" and "under what conditions" digital finance impacts are most beneficial or potentially harmful. Identification of vulnerable populations who experience adverse effects despite aggregate benefits addresses critical equity concerns underexplored in the literature, which tends to focus on average treatment effects. The policy implications of these heterogeneous effects are substantial, suggesting that a one-size-fits-all approach to digital finance promotion may be inadequate and potentially harmful for certain subgroups.

Positioning *penelitian ini* within a broader theoretical context, the empirical findings provide support for competing theoretical perspectives about technology and behavior. Behavioral economics theories regarding *mental accounting* and friction reduction receive support from the observed increases in consumption, particularly for hedonic purchases. Liquidity constraint theories receive support from the strongest consumption effects among middle-income households that likely face binding credit constraints. The financial capability framework receives support from documented improvements in financial literacy and planning behaviors. Simultaneously, the research findings challenge simplistic narratives about unambiguously positive or negative effects, instead revealing a complex interplay of mechanisms that produce heterogeneous outcomes across individuals and domains.

Several findings in this study warrant particular attention as they contradict conventional expectations or existing literature. Most notably, while digital finance adoption significantly improves access to formal savings mechanisms and enhances

financial planning behaviors, users paradoxically maintain lower aggregate savings balances compared to matched non-users (5.8% reduction). This counterintuitive result challenges the prevailing assumption that improved financial inclusion automatically translates to better savings outcomes, suggesting instead that enhanced liquidity access may enable consumption smoothing that depletes precautionary savings buffers. Additionally, the finding that financial literacy scores improve post-adoption yet debt burdens simultaneously increase presents an apparent contradiction that merits careful interpretation.

Rather than indicating ineffective financial education, this pattern likely reflects more sophisticated credit utilization among financially literate users who strategically leverage digital credit products for investment or business purposes, though distinguishing productive from problematic borrowing remains methodologically challenging. Perhaps most unexpected is the heterogeneity in financial well-being outcomes across demographic segments, with young lower-middle-income households experiencing simultaneously the strongest consumption increases and the most pronounced financial stress indicators.

This suggests that digital finance platforms may inadequately screen for debt capacity or fail to provide sufficient behavioral guardrails for vulnerable user segments, highlighting critical gaps between financial inclusion metrics and substantive financial welfare improvements. These contradictions underscore the complexity of digital finance impacts and challenge simplistic narratives promoting uncritical technology adoption without adequate consumer protection frameworks. This research provides important guidance for various parties. Regulators need to create balanced policies that protect consumers from the risks of overconsumption and overleveraging through mandatory affordability assessments, interest rate caps, and cooling-off periods for impulsive borrowing. Fintech companies and financial institutions should design platforms that encourage responsible financial behavior by adding features to promote savings, clearly displaying credit costs, and providing additional protections for vulnerable groups such as young, low-income consumers. Meanwhile, financial educators can leverage digital platforms as a more effective learning medium through hands-on learning during transactions, rather than solely in the classroom.

This study has several important limitations that should be considered. First, the use of observational data and self-report surveys has the potential to contain bias, despite the use of instrumental variables and panel data. Second, the study only examined short-term effects, a maximum of 24 months, so the long-term impact on wealth accumulation and economic mobility remains unknown. Third, the study did not measure in depth individual psychological factors such as self-control and risk preferences, nor did it examine spillover effects at the community level and the financial system. Finally, the study's findings are limited to a specific country and time, so cross-country research is needed to validate these findings across different contexts.

CONCLUSION

This investigation reveals complex relationships between digital finance usage and consumer economic behavior using nationally representative data. Digital finance adoption fundamentally reshapes consumer behavior through interconnected pathways, producing both beneficial and adverse outcomes. Users exhibit substantially elevated consumption expenditure (8–11 percent) in discretionary categories while

paradoxically experiencing reduced savings balances and elevated debt-to-income ratios despite improved financial inclusion. The most consistently positive finding concerns enhanced financial literacy, planning behavior, and management practices. Panel data evidence establishing within-individual literacy improvements provides strong causal support for digital platforms as effective financial education vehicles, with composite well-being indices indicating net positive effects partially offsetting consumption and leverage risks.

Financial technology providers gain insights into responsible platform design, including automated savings mechanisms and transparent credit disclosure. Theoretically, findings reconcile competing behavioral economics perspectives, demonstrating that digital finance simultaneously activates multiple mechanisms with countervailing effects. Maximizing societal benefits requires moving beyond techno-optimistic promotion toward nuanced strategies recognizing heterogeneous impacts and actively mitigating risks for vulnerable populations while preserving innovation benefits.

ACKNOWLEDGEMENT

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