



Empowering the Elderly Consumers: The Role of Digital Technology in Reshaping Aging Household Consumption in China



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Introduction

Why do we choose China?

- As a developing nation and the country with the world's largest elderly population exceeding 300 million, China's large elderly population, rapid aging rate, and issues like "growing old before becoming rich" make addressing population aging an increasingly daunting task
- As a nation experiencing rapid digital technology advancement, the application of digital technology in China has reshaped the lifestyles of the elderly population, changed their preferences and constraints, and precipitated novel transformations in consumption concepts and content



China provides a compelling setting for exploring this question



Research Objectives

- Examine the causal effect of digital technology use on aging household consumption and structural shifts
- Investigate mediating pathways and heterogeneous effects across demographics
- Analyze how digital technology bridges consumption gaps for vulnerable groups while identifying the precondition



Methods-Data

- Data (China Family Panel Studies, CFPS)
 - Nationally representative data from 2020 and 2022
 - Covers 18,858 households in 25 provinces via clustered sampling
 - Includes individual-level & household-level data
- Sample Screening Criteria
 - Retain households with heads aged ≥ 60
 - Exclude: missing key variables; non-positive consumption; single-household provinces (Qinghai/Ningxia/Hainan)



Final Samples: 4,233 elderly-headed households



Methods-Model

$$Y_{it} = \alpha_0 + \alpha_1 \cdot IU_{it} + \beta X_{it} + \gamma_\rho + \lambda_t + \varepsilon_{it}$$

where Y_{it} is the dependent variable representing household consumption. IU_{it} represents the core explanatory variable: internet use. α_1 denotes the marginal effect of digital technology use on household consumption. X_{it} indicates all control variables introduced above. γ_ρ and λ_t correspond to province fixed effects and time fixed effects respectively. ε_{it} is a residual term.



Methods-Variables

Panel A

Variable definition

Variable	Definition
Consumption	Natural logarithm of annual household consumption
IU	Internet use status of household head (1 = has internet access, 0 = no access)
Age	Age of household head
Gender	Gender of household head (1 = male, 0 = female)
Employ	Current employment status of household head (1 = employed, 0 = not employed)
Education	Schooling years of household head
Rural	Household residence location (1 = rural area, 0 = urban area)
Wealth	Natural logarithm of total household cash and deposits
House	Natural logarithm of household net housing assets
Income	Natural logarithm of household income per capita
Old_rate	Proportion of household members aged 65 and above

Panel B

Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Consumption	4233	10.385	1.008	6.043	15.201
IU	4233	0.351	0.477	0	1
Age	4233	68.357	6.007	60	95
Gender	4233	0.741	0.438	0	1
Employ	4233	0.548	0.498	0	1
Education	4233	6.464	4.669	0	19
Rural	4233	0.511	0.5	0	1
Wealth	4233	7.493	4.821	0	15.425
House	4233	10.497	4.439	0	17.217
Income	4233	9.61	1.187	0	15.745
Old_rate	4233	0.567	0.418	0	1



Results-Baseline results

VARIABLES	(1) Consumption	(2) Consumption	(3) Consumption	(4) Consumption	(5) Consumption
IU	0.569*** (0.031)	0.367*** (0.032)	0.185*** (0.029)	0.170*** (0.029)	0.162*** (0.029)
Age		-0.018*** (0.003)	-0.014*** (0.002)	-0.015*** (0.002)	-0.015*** (0.002)
Gender		0.085** (0.034)	0.086*** (0.031)	0.081*** (0.031)	0.079** (0.035)
Employ		-0.340*** (0.031)	-0.133*** (0.030)	-0.124*** (0.030)	-0.125*** (0.033)
Education		0.043*** (0.003)	0.016*** (0.003)	0.016*** (0.003)	0.016*** (0.004)
Rural			-0.254*** (0.030)	-0.239*** (0.030)	-0.240*** (0.034)
Wealth			0.020*** (0.003)	0.019*** (0.003)	0.018*** (0.003)
House			0.030*** (0.003)	0.027*** (0.003)	0.028*** (0.003)
Income			0.268*** (0.013)	0.254*** (0.013)	0.254*** (0.020)
Constant	10.185*** (0.019)	11.339*** (0.187)	8.276*** (0.210)	8.486*** (0.213)	8.513*** (0.268)
Individual-level controls	No	Yes	Yes	Yes	Yes
Household-level controls	No	No	Yes	Yes	Yes
Province fixed effect	No	No	No	Yes	Yes
Year fixed effect	No	No	No	No	Yes
Observations	4,233	4,233	4,233	4,233	4,233
Adjusted R ²	0.073	0.152	0.324	0.343	0.344

Note: Superscripts *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.



Results-Robustness checks

➤ **Substitute dependent variable**

- Replace it with total household expenditure
- Replace it with per capita household consumption expenditure

➤ **Change regression model**

- Employ generalized linear model (GLM)

➤ **Adjust the sample scope**

- Restrict analysis to households with heads aged 65 and above
- Exclude sample from direct-administered municipalities (Beijing, Shanghai, Tianjin, Chongqing)

➤ **Mitigate endogeneity**

- Add province-year interactive fixed effects
- Propensity Score Matching (PSM): Kernel matching/ 1:1 nearest neighbor matching/ 1:5 nearest neighbor matching



Results-Consumption structure

➤ Household consumption categories

- Food, Clothing, Housing, Daily necessities, Health care, Transportation and communication, Entertainment, Other Consumption

➤ Household consumption structure

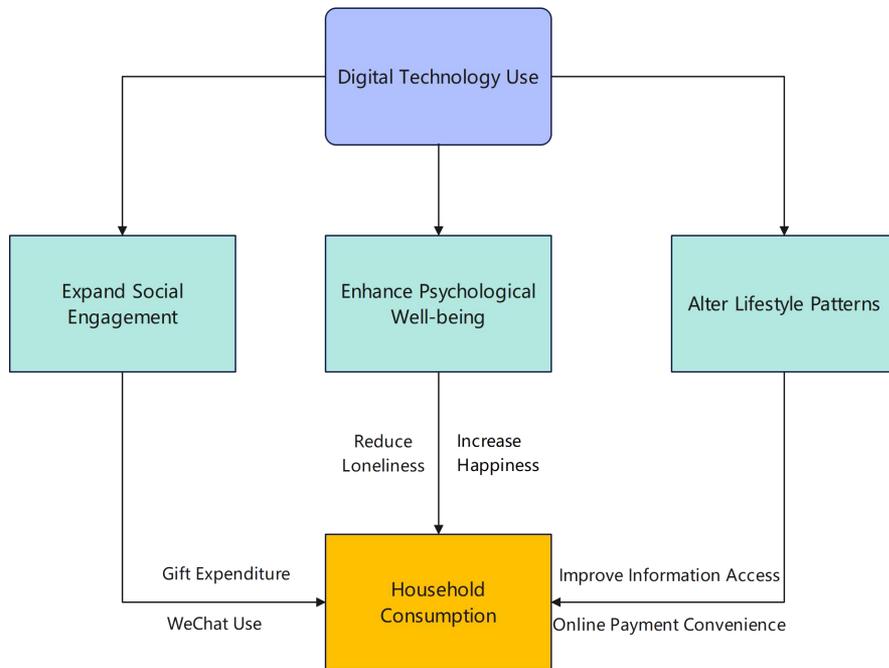
- Survival-oriented consumption structure (Food, Housing, Health care and Daily necessities)
- Enjoyment-oriented consumption structure (Clothing, Transportation and communication)
- Development-oriented consumption structure (Entertainment)

➤ Index

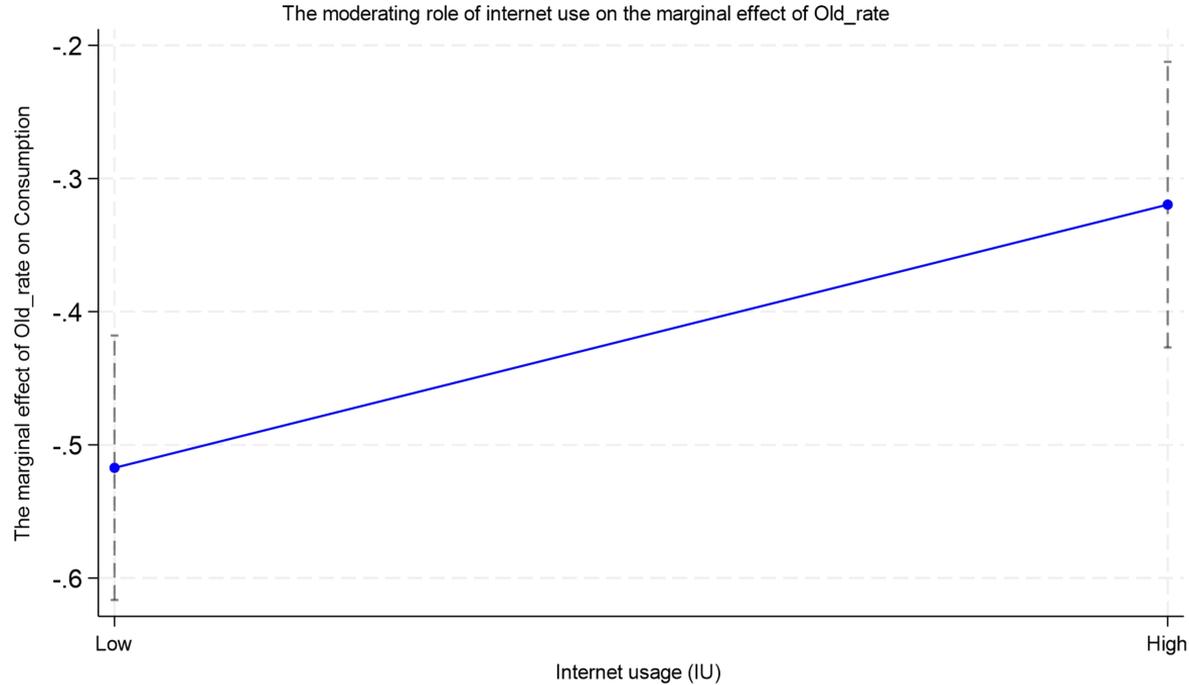
- Consumption quality index: measured by the proportion of expenditure on goods and services that enhance life satisfaction and well-being (Entertainment, Travel, Health care, and Durable goods)
- Consumption diversity index: inversely measured by the proportion of necessities (Food, Clothing, and Housing)



Results-Mechanism results



Results-Moderating effect



Results-Heterogeneity analysis

➤ Analysis by demographic characteristics

- Households with male head vs Households with female head
- Households with head under 70 vs Households with head over 70
- Large households (members >3) vs Small households (members ≤3)

➤ Analysis by inclusion of digital technology use

- Households with urban hukou vs Households with rural hukou
- Households with mobile head vs Households with mobility-constrained head
- Households with employed head vs Households with unemployed head

➤ Analysis by consumption and income levels

- low/medium/high consumption households
- low/medium/high income households



Discussion-Conclusions

- Digital technology use increases annual consumption by 18.2% for aging households, and this conclusion remains robust across multiple robustness checks
- Digital technology use decreases survival-oriented consumption and increases enjoyment-oriented and development-oriented consumption, while enhancing consumption quality and diversity
- Mechanisms include expanding social participation, enhancing psychological capital, and altering lifestyles
- Digital technology mitigates negative pressures from population aging on household consumption, indicating significant potential to stimulate consumption in aging societies
- Effects are stronger in female-headed, older-headed, smaller-sized, rural, mobility-limited, and unemployed-headed households
- Digital technology's value in mitigating consumption insufficiency is restricted by household income. Maximizing efficacy requires enhancing residents' income and pension, as well as bridging the digital divide through rural internet upgrades, affordable devices, and training



Discussion-Contributions

- Use household-level data to provide direct evidence of digital technology's positive impact on aging household consumption, enhancing practical relevance over macro-data studies
- Identify mediating mechanisms and heterogeneous effects, demonstrating digital technology empowers aging consumption discourse and improves well-being
- Reveal digital inclusiveness benefits vulnerable groups while highlighting household income as the precondition



Discussion-Limitations

- Significant changes in the statistical standards for digital technology use variables within CFPS dataset around 2020 prevent the use of full dataset (2010-2022)
- The CFPS dataset only provides basic data on residents' digital technology use, lacking indicators such as coverage rates of digital application scenarios, use frequency, or use proficiency
- The CFPS dataset only provides household-level rather than individual-level consumption data, restricting the analysis to the household level and substantially reducing the sample size.
- The sample with certain Chinese characteristics such as high savings rates and low consumption rates limits generalizability, findings may differ in populations with distinct countries



