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Research on the Impact of Digital Development of Cultural Industry on Resident Consumption

Yi Yang

Nanjing University of Information Science and Technology, Nanjing, China
Yangyi_w0@163.com

Abstract. Against the backdrop of China's national cultural digitization strategy, this study examines the impact of cultural industry digitalization on residents' overall consumption using provincial panel data (2014–2022). We construct an entropy-based indicator system that synthesizes five key dimensions—digital base, development environment, demand conditions, cultural innovation, and coordinated development—to comprehensively measure the level of cultural industry digitalization and apply two-way fixed effects model to identify mechanisms. Key findings demonstrate: (1) Digitalization of the cultural industry significantly boosts residents' overall consumption; (2) Stronger effects in rural areas than urban, and western regions than central/eastern; (3) The underlying mechanisms involve the upgrading of income and industrial structure. We recommend multi-dimensional digital upgrades, optimized income mechanisms, and differentiated regional strategies to promote the digitalization of the cultural industry and drive the growth of residents' consumption. These findings provide robust empirical evidence and policy insights for policymakers to optimize digital cultural infrastructure and narrow urban-rural and regional consumption disparities through targeted policy interventions.

Keywords: Digitalization of cultural industry, residents' overall consumption level, Digital economy, Two-way fixed effect model.

1. Introduction

The cultural industry, encompassing film, television, tourism, and education sectors, converts cultural creativity into economic value through content production and dissemination. Digitalization via AI, blockchain, and cloud computing revolutionizes value chains by shifting analog processes to data-driven systems. Cultural industry digitalization thus represents the organic integration of culture and technology, exemplified by digital film production (e.g., digital special effects) and smart cultural tourism platforms (e.g., blockchain-based asset management). In 2022, the General Office of the Central Committee and the General Office of the State Council jointly released the "Opinions on Promoting the Implementation of the National Cultural Digitization Strategy". Through establishing unified digital platforms and data governance frameworks, this strategy directly stimulates residents' consumption. Based on Marxist perspective, residents' consumption directly fuels economic growth by driving market demand and enabling production expansion. This study employs statistical analysis to empirically examine the impact of cultural industry

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digitalization on residents' consumption, while exploring viable pathways to advance the in-depth digital transformation of China's cultural sector and foster sustained growth in residents' consumption.

2. Theory and hypotheses

2.1. The direct impact

The integration of information technology and cultural industries has fundamentally reshaped consumption patterns, expanding choice diversity and elevating consumption levels through innovative digital formats. Western scholarship consistently evidences the cultural industry's positive role in promoting local economic development [1]. Digital development reshapes consumption habits and injects new behavioral impetus [2]. The digital economy demonstrates significant capacity to upgrade residents' consumption structures [3]. Improved digital infrastructure construction is also proven to directly stimulate consumption growth [4,5].

Hypothesis 1: The development of cultural industry digitization can promote residents' overall consumption.

2.2. The indirect impact

2.2.1. The digital development of cultural industry promotes residents' overall consumption through the income effect

The digital-cultural fusion generates employment and income growth opportunities, thereby stimulating residents' consumption through enhanced purchasing power. The digitalization of cultural industry significantly raises incomes by generating employment in emerging fields like e-commerce livestreaming and digital content creation. The digital economy can drive the growth of residents' consumption through the "income effect" [6]. The digital divide can limit the consumption potential of some residents [7].

Hypothesis 2: The digital development of cultural industry promotes residents' overall consumption through the income effect.

2.2.2. The digital development of cultural industry promotes residents' overall consumption through industrial upgrading effect

Industrial upgrading constitutes another critical pathway, which affects residents' overall consumption. Digital restructuring elevates consumption quality by reallocating resources within Marx's production-consumption framework. Digital cultural development is empirically linked to industrial upgrading, which subsequently enhances consumption [8]. This upgrading process is further amplified by demographic shifts, particularly accelerated aging and urbanization [9,10].

Hypothesis 3: The digital development of cultural industry promotes residents' overall consumption through industrial upgrading effect.

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3. Model specification and data description

3.1. Model specification

Existing research indicates that digitalization in the cultural industry affects residents' consumption both directly and indirectly. This study establishes score as the explanatory variable, consume as the dependent variable, PCDI and UIS as mediator variables. To enhance the rigor of the study, pgdp, urban, edu, and age are included as control variables (Figure 1).

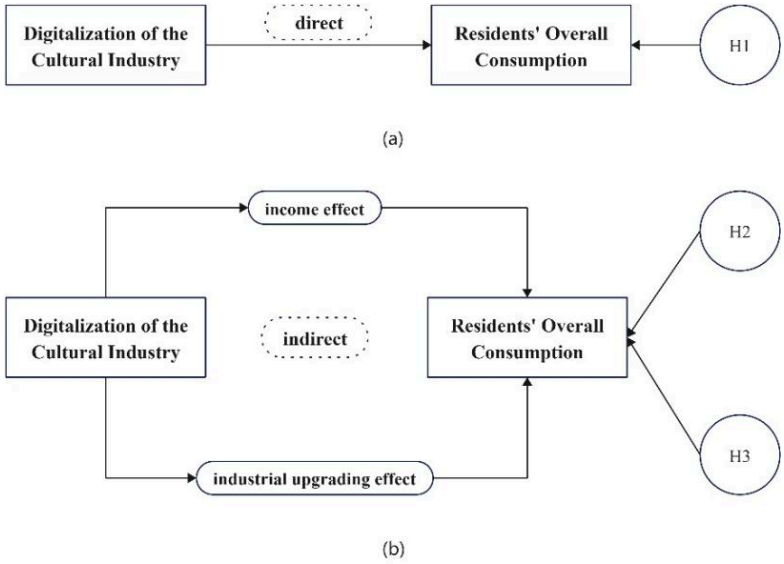

Figure 1. Impact path

The baseline model as shown in Equation (1):

$$consume_{it} = \beta_0 + \beta_1 score_{it} + \sum_{m=2}^{n} \beta_m x_{mit} + \mu_i + \delta_t + \varepsilon_{it} \quad (1)$$

Where $consume_{it}$ represents the level of residents' overall consumption, $score_{it}$ represents the degree of digital development of cultural industry, β_1 is the coefficient of the influence of digital development of cultural industry on residents' overall consumption, x_{mit} is other series of variables affecting residents' overall consumption, which is used to control other factors. β_m represents the coefficient of the influence of the digital development of cultural industry on the control variables, n represents the total number of control variables, μ_i represents the regional fixed effect, δ_t represents the time fixed effect, and ε_{it} is the disturbance/noise term.

The mediating effect model is verified by referring to the three-step method, and the model is shown in Equation (2), (3) and (4).

$$consume_{it} = \beta_0 + \beta_1 score_{it} + \sum_{m=2}^{n} \beta_m x_{mit} + \mu_i + \delta_t + \varepsilon_{it} \quad (2)$$

$$M_{it} = \gamma_0 + \gamma_1 score_{it} + \sum_{m=2}^{n} \gamma_m x_{mit} + \mu_i + \delta_t + \varepsilon_{it} \quad (3)$$

$$consume_{it} = \lambda_0 + \lambda_1 score_{it} + \sum_{m=2}^{n} \lambda_m x_{mit} + \mu_i + \delta_t + \varepsilon_{it} \quad (4)$$

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M_{it} is the mediating variable, including $PCDI$ and UIS, which respectively represent residents' income level and industrial structure upgrading. γ_1 represents the effect of the digital development level of the cultural industry on the mediating variable, and λ_1 represents the influence coefficient after the intermediary variable.

3.2. Variable construction

Variable definitions and measurements are summarized (Table 1).

Table 1. Description of variables

Variable names	Letters denote	Indicator description
Explained variable	$consume$	Residents' per capita consumption expenditure
Core explanatory variables	$score$	Comprehensive score of digital development of cultural industry
Control variables	$pgdp$	GNP per capita
	$urban$	Urban population/total population
	edu	Average number of students enrolled in higher education per 100,000 population
	age	The dependency ratio of the elderly population
Mediating variable	$PCDI$	Per capita disposable income of residents
	UIS	Added value of the tertiary industry/added value of the secondary industry

Note:Data for all variables (except score) were obtained from China Statistical Yearbooks; Missing data were handled through linear interpolation and outliers were removed.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Median	Max
consume	259	19280.282	6894.289	9875.000	17644.000	48879.300
score	259	0.003	0.003	0.001	0.002	0.021
pgdp	259	62326.282	27721.363	25724.000	54640.000	175420.000
urban	259	60.817	10.684	33.238	59.875	89.313
edu	259	2805.932	773.788	1220.028	2653.000	5428.830
age	259	16.508	4.529	8.040	15.920	28.770
PCDI	259	27650.385	11134.896	12185.000	24949.900	78026.600
UIS	259	1.407	0.656	0.704	1.286	5.234

All variables exhibit obvious dispersion and differentiation characteristics in the sample (Table 2).

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3.3. Measurement of cultural industry digitalization level

The system comprises five primary indicators (digital base, development environment, demand conditions, cultural innovation, and coordinated development), supported by 13 secondary indicators and 27 tertiary indicators (Table 3).

Table 3. Index system

First-level indicators	Secondary indicators	Tertiary indicators	Attributes
Digital base	Hardware facilities	The capacity of mobile phone switch per square kilometer (c1)	+
		The length of long-distance optical cable lines per square kilometer (km) (c2)	+
		The internet broadband access ports per square kilometer (ten thousand) (c3)	+
	Network resources	The number of domain names per thousand people (c4)	+
		The number of websites per thousand people (c5)	+
		The number of pages per person (c6)	+
		The number of Internet broadband access users per 1,000 people (c7)	+
Development environment	Cultural resources	The number of public library per capita (volumes) c8	+
		The number of cultural relics collected per capita (pieces) (c9)	+
	Cultural facilities	The building area of mass cultural facilities per 10,000 people (square meters) (c10)	+
		The building area of public libraries per 10,000 people (square meters) (c11)	+
		The number of museums (c12)	+
	Government support	The proportion of culture, sports and media expenditure in local general public budget (%) (c13)	+
Demand conditions	Digital culture consumption demand	Per capita consumption of electronic publishing (sales amount of publications/average annual population of the region) (ten thousand yuan/ten thousand people) (c14)	+
		Per capita online animation consumption (online animation business income/regional average annual population) (ten thousand yuan/ten thousand people) (c15)	+
	Digital culture employment demand	The proportion of employees in cultural and entertainment units in total urban employment (%) (c16)	+
		The proportion of employees in information technology units in total urban employment (%) (c17)	+
	Digital transaction demand	The proportion of enterprises with e-commerce transactions (%) (c18)	+
		The number of websites per 100 enterprises (c19)	+

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Table 3.(continued)

Cultural innovation	Education level	The number of professional and technical personnel in educational institutions of cultural departments (c20)	+
		The average number of students in higher education per 100,000 population (c21)	+
	Scientific research level	The number of professional and technical personnel in cultural relics research institutions (c22)	+
		The total number of patents authorized in cultural and related industry (c23)	+
		The number of professional and technical personnel in cultural relics protection and administration institutions (c24)	+
Coordinated development	Industrial structure coordination	The proportion of operating income of cultural service enterprises in total operating income (%) (c25)	+
	Urban and rural consumption coordination	Per capita cultural and entertainment consumption of urban residents/per capita cultural and entertainment consumption of rural residents (Yuan) (c26)	moderation
	Market supply coordination	The number of cultural market operating institutions per 10,000 people (c27)	+

The weights derived from the entropy method are presented (Table 4).

Table 4. The weights of each index for cultural industry digital development level of 2014 - 2022

Indicators	Weights	Indicators	Weights	Indicators	Weights
cl	6.98%	c10	1.95%	c19	0.45%
c2	2.11%	c11	2.63%	c20	3.08%
c3	6.88%	c12	2.08%	c21	1.04%
c4	6.63%	cl3	1.33%	c22	3.28%
c5	6.60%	c14	2.00%	c23	8.39%
c6	13.17%	c15	10.93%	c24	3.29%
c7	1.04%	c16	2.11%	c25	1.36%
c8	2.55%	c17	4.25%	c26	0.11%
c9	4.08%	c18	0.92%	c27	0.76%

According to the latest regional classification standards released by the National Bureau of Statistics in 2023, China's mainland is divided into three major economic regions: eastern, central, and western. The digital development index of the cultural industry presents an obvious trend of higher development in the east and lower development in the west (Table 5). This spatial pattern primarily stems from three key factors: (1) more advanced digital infrastructure in economically developed regions, enabling superior technological adoption; (2) higher education levels among eastern populations, fostering greater digital literacy and cultural content creation capabilities (particularly in film/TV production and digital media); (3) substantially greater resource investments in local cultural industries by eastern provincial governments and private enterprises.

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Table 5. Digital development index of cultural industry by region

Region \ year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Eastern	0.0395	0.0467	0.0516	0.0571	0.0600	0.0635	0.0653	0.0716	0.1104
Central	0.0281	0.0311	0.0332	0.0345	0.0370	0.0409	0.0432	0.0455	0.0613
Western	0.0049	0.0055	0.0057	0.0062	0.0064	0.0073	0.0077	0.0078	0.0109
National average	0.0242	0.0278	0.0302	0.0326	0.0345	0.0372	0.0387	0.0416	0.0609

4. Empirical analysis

4.1. Correlation analysis

All of the control variables at the significance level of 1%, roughly in line with expectations (Table 6).

Table 6. Correlation coefficient matrix

	consume	score	pgdp	urban	edu	age
consume	1					
score	0.869***	1				
pgdp	0.943***	0.837***	1			
urban	0.867***	0.745***	0.821***	1		
edu	0.556***	0.587***	0.573***	0.632***	1	
age	0.357***	0.132**	0.333***	0.336***	0.541***	1

The low VIF values for edu and age indicate that multicollinearity between them and the other variables is less of a problem. The average VIF value is 3.52, which also indicates that the multicollinearity problem is not serious overall (Table 7).

Table 7. Multicollinearity test results

Variable	VIF	1/VIF
score	4.51	0.221657
pgdp	5.30	0.188620
urban	3.53	0.283105
edu	2.47	0.404404
age	1.78	0.561258
Mean VIF	3.52	

4.2. Benchmark regression analysis

All benchmark regressions (Table 8) demonstrate a statistically significant positive impact ($p<0.01$) of cultural industry digitalization on resident consumption: OLS ($\beta=0.391$), individual fixed effects ($\beta=0.263$), and two-way fixed effects ($\beta=0.293$). From the above results that score has a positive and significant effect on residents' overall consumption level consume under either OLS model, individual fixed effect model or double fixed effect model, indicating that score will positively

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promote the improvement of residents' overall consumption level consume. The final conclusions are mainly based on the results of two-way fixed effects.

Therefore, H1 is verified: the digital development of cultural industry can promote residents' overall consumption.

Table 8. Benchmark regression results

	(OLS)	(Individual Fixed Effect)	(Two-way Fixed Effect)
Variable	consume	consume	consume
score	0.391***	0.263***	0.293***
	(0.033)	(0.043)	(0.040)
pgdp	0.443***	0.526***	0.355***
	(0.032)	(0.041)	(0.048)
urban	0.262***	0.474***	0.170*
	(0.025)	(0.053)	(0.088)
edu	-0.178***	-0.040	-0.004
	(0.022)	(0.028)	(0.033)
age	0.130***	0.046**	0.022
	(0.016)	(0.021)	(0.020)
Constant	-0.029***	-0.156***	-0.024
	(0.009)	(0.018)	(0.040)
Observations	259	259	259
R-squared	0.947	0.938	0.954
ID	NO	YES	YES
YEAR	NO	NO	YES
r2_a	0.946	0.928	0.945
F	909.9	671.5	346.1
Number of Province	31	31	31

Standard errors in parentheses

* p < 0.1, ** p < 0.05, *** p < 0.01

4.3. Analysis of heterogeneity

The urban-rural heterogeneity test results (Table 9) reveal that the digitalization of the cultural industry has a statistically significant positive impact on both urban and rural residents' consumption at the 1% level, with a more pronounced effect in rural areas. First, the long-standing limitations in rural cultural consumption make digital products more marginally stimulating. Second, rural digitalization represents a "strengthening weak links" approach that breaks resource barriers and significantly boosts consumption willingness, whereas urban development mainly involves optimization and upgrading. Third, rural consumption concepts evolve rapidly and tend to create bandwagon effects, while urban consumption exhibits more personalized characteristics.

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Table 9. Urban-rural heterogeneity test

	(1)	(2)	(3)	(4)
	Urban areas	Urban areas	Rural areas	Rural areas
Variable	consume	consume	consume	consume
score	0.295***	0.281***	0.335***	0.348***
	(0.045)	(0.056)	(0.050)	(0.062)
pgdp		0.141***		0.100*
		(0.050)		(0.056)
urban		-0.170***		-0.183***
		(0.044)		(0.049)
edu		-0.090***		-0.111***
		(0.033)		(0.037)
age		-0.006		0.027
		(0.024)		(0.027)
Constant	0.100***	0.181***	0.093***	0.182***
	(0.007)	(0.015)	(0.008)	(0.017)
Observations	259	259	259	259
R-squared	0.905	0.921	0.933	0.944
Number of Province	31	31	31	31
ID	YES	YES	YES	YES
YEAR	YES	YES	YES	YES
r2_a	0.888	0.905	0.921	0.932
F	231.7	192.3	339.6	276.6

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The heterogeneity test results across regions (Table 10) demonstrate varying impacts of cultural industry digitalization on resident consumption, with statistically significant positive effects observed in all regions. Notably, the western region exhibits the strongest influence (coefficient=0.582, $p<0.01$), followed by the central and eastern regions. The amplified effect in less-developed regions suggests technological adoption yields proportionally greater consumption stimulation where initial development levels are lower, consistent with the law of diminishing marginal returns in more advanced economies.

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Table 10. Heterogeneity test in the eastern, central and western regions

	(1)	(2)	(3)
	Eastern	Central	Western
Variable	consume	consume	consume
score	0.142**	0.295***	0.582***
	(0.062)	(0.075)	(0.142)
Constant	0.100	-0.078	-0.026
	(0.106)	(0.089)	(0.053)
Control variables	YES	YES	YES
Observations	87	70	102
R-squared	0.968	0.970	0.958
Number of Province	11	8	12
ID	YES	YES	YES
YEAR	YES	YES	YES
r2_a	0.957	0.958	0.945
F	148.3	123.7	134.4

Standard errors in parentheses

* p < 0.1, ** p < 0.05, *** p < 0.01

4.4. Mechanism test

The mediation analysis results (Table 11) demonstrate that cultural industry digitalization affects consumption through income enhancement and industrial structure upgrading.

Table 11. Mediating effect test (residents' income level/industrial structure upgrading)

	(1)	(2)	(3)	(4)	(5)	(6)
Variable	consume	PCDI	consume	consume	UIS	consume
score	0.293***	0.202***	0.130***	0.293***	0.266***	0.185***
	(0.040)	(0.028)	(0.038)	(0.040)	(0.049)	(0.038)
PCDI			0.804***			0.406***
			(0.082)			(0.049)
Constant	-0.024	0.148***	-0.143***	-0.024	0.222***	-0.114***
	(0.040)	(0.028)	(0.036)	(0.040)	(0.048)	(0.037)
Control variables	YES	YES	YES	YES	YES	YES
Observations	259	259	259	259	259	259
R-squared	0.954	0.978	0.968	0.954	0.668	0.965
Number of Province	31	31	31	31	31	31
ID	YES	YES	YES	YES	YES	YES
YEAR	YES	YES	YES	YES	YES	YES
r2_a	0.945	0.974	0.962	0.945	0.602	0.958
F	346.1	748.8	469.4	346.1	33.28	425.1

Standard errors in parentheses

* p < 0.1, ** p < 0.05, *** p < 0.01

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Benchmark regressions (columns 1/4) show direct effects, while subsequent models reveal the mediation mechanisms. Specifically, incorporating residents' income (PCDI) as a mediator reduces the direct effect coefficient, with income's mediation effect accounting for 55.43% of the total impact (0.202×0.804/0.293). The 1% significance level across all coefficients confirms robust mediation. Therefore, H2 is verified: the digital development of cultural industry promotes residents' overall consumption through the income effect.

The regression results with industrial structure upgrading (UIS) as the mediating variable, the coefficient decreases significantly, and the direct impact of cultural industry digitalization on industrial structure upgrading shows significance at the 1% level, confirming UIS's crucial mediating role. Calculations reveal a mediation effect proportion of 36.86% (0.266×0.406/0.293). Therefore, H3 is verified: the digital development of cultural industry promotes residents' overall consumption through industrial upgrading effect.

5. Countermeasures

We need to strengthen the construction of digital foundation dimension, making up the weak links in the dimension of coordinated development, to improve the digital development level of cultural industry in a Multi-dimensional Manner. Use the "Rural Digital Talent Revitalization Plan" and tax incentives to establish a digital employment promotion mechanism. Promoting the digital transformation of the cultural industry to improve the Income Distribution Mechanism and Promote the Upgrading of Industrial Structure. Establish a dynamic and balanced development mechanism to promote coordinated regional development. As implement the "Rural digital Culture Inclusive Project", and focusing on supporting the construction of the Silk Road digital Culture Industry Belt, and differentiated regional assessment indicators should be formulated to avoid one-size-fits-all.

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