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Impact of the Digital Economy and Financial Development on Residents' Consumption Upgrading: Evidence from Mainland China

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Abstract: Consumption upgrading reflects people's pursuit of a better life and is an important engine of high-quality economic development. Based on the panel data of 30 provinces in China from 2006 to 2021, this study analyses the impact and mechanism of the digital economy and financial development on residents' consumption upgrading from a macro perspective. The findings demonstrate that the digital economy, financial development, and their synergistic effect significantly promote residents' consumption upgrading, which improves the overall level of residents' consumption expenditure and promotes the transformation of the residents' consumption structure from subsistence to development and enjoyment expenditure. The common mechanism of the digital economy and financial development is industrial structure optimization. The positive effects of the digital economy, financial development, and their synergy on residents' consumption upgrading have obvious regional and urban–rural heterogeneity and show nonlinear characteristics with the advancement of new urbanization.

Keywords: digital economy; financial development; consumption upgrading; industrial structure optimization; synergy effect

1. Introduction

Consumption is the engine of economic growth. In the current context where China's exports are complex and changeable due to the influence of the external environment, investment is difficult to boost in the short term under the pressure of 'capacity loss'. Consequently, the economy is facing downwards pressure and consumption upgrading has become an important means to promote the expansion of consumer demand, the enhancement of the internal power of consumption, and the release of consumption capacity and potential [1,2].

In recent years, due to improvements in the quality of life of Chinese residents and the continuous expansion of their consumption scale, the residents' consumption structure (CS) has been upgraded and optimized. According to the National Bureau of Statistics of China, in 2021, residents' per capita consumer expenditure was 24,100 yuan, an increase of 11.8% compared to that of 2019. Moreover, the average consumer expenditure growth rates for the three major categories of transport and communication; education, culture, and entertainment; and healthcare were 5%, 1.7%, and 4%, respectively, compared to those of 2019. Residents' consumption has gradually upgraded from subsistence to brand and quality consumption [3]. However, many problems remain in the consumption-upgrading process, such as low consumption rates, insufficient supply of service-oriented consumption, the rapid rise in residents' debt ratio, and the gap between consumer goods, industrial manufacturing, and consumption upgrading [4,5]. Therefore, in China, the digital economy (DE) and financial development (FD) are considered important means to promote residents' consumption upgrading.

The rapid development of the DE has become a powerful driving force for the digital transformation of traditional innovation, industry, and supply chains, creating many new consumption patterns. The continuous influence of the DE on the scale and structure of residents' consumption has stimulated the potential of the Chinese consumer market [6]. FD unlocks residents' consumption potential and promotes national economic growth by reducing liquidity constraints [7]. The deepening of financial reform also makes the distribution of industrial elements more reasonable, optimizes the industrial structure, satisfies residents' changing consumption needs, and alleviates the supply constraints in consumption upgrading [8].

At the macro level, studies on the empowering effect of the DE and FD on residents' consumption upgrading have attracted the attention of academia and government decision-makers due to the steady and high-quality economic growth in China. From a macro perspective, this study attempts to analyze the impact of the DE and FD on residents' consumption upgrading, test the existence of their synergistic effect, and clarify the common mechanism. This is conducive to enabling a deeper understanding of the comprehensive impact of the DE and FD on residents' consumption upgrading. Simultaneously, this study contributes new empirical evidence for identifying the influencing factors of residents' consumption upgrading and further provides a decision-making reference for improving the living standards of urban and rural residents. This study makes the following contributions:

First, from a macro perspective, this study uses the entropy method to construct a DE development index at the provincial level based on three aspects—digital infrastructure, digital industry development, and digital talent reserves—to measure the development level of the DE in Chinese provinces more comprehensively and objectively.

Second, this study integrates DE and FD into the same research framework, comprehensively examines the synergistic effect of the DE and FD on residents' consumption upgrading, explores the common mechanism, and examines the heterogeneity and nonlinear characteristics, thus enriching the research in related fields.

Third, from a macro perspective, this study provides a reference for expanding the domestic demand and enhancing the endogenous power of economic growth.

The remainder of this paper is organized as follows: the Section 2 presents the literature review, the Section 3 proposes the research hypotheses via theoretical analysis, the Section 4 describes the research model and data, the Section 5 illustrates the empirical results, the Section 6 elaborates on the conclusions and policy recommendations, and the Section 7 presents the limitations and future prospects.

2. Literature Review

The previous research mainly falls into three categories: the impact of the DE, FD, and new digital financial services on residents' consumption upgrading, as follows:

1. The impact of the DE on residents' consumption upgrading. Since the DE concept was first proposed by Tapscott in 1996, research on its impact on residents' consumption upgrading gradually increased. Digital consumption platforms can digitize consumers' real-life consumption preferences to provide personalized goods and services, effectively improve information transmission efficiency, and reduces consumers' shopping time [9]. From the residents' perspective, the DE is convenient for consumption. Alongside reducing information asymmetry, the DE enables consumers to easily compare the price and quality of products and understand product characteristics [10]. From a macroeconomic perspective, the intensification of competition in the digital market reduces product prices and increases consumer welfare [11]. The construction of digital infrastructure can increase the employment rate and enhance the vitality of the local economy, thus promoting residents' consumption [12]. Moreover, advances in digital technology can alter residents' consumption preferences and affect their consumption decisions. Therefore, the development of the DE can more effectively satisfy consumers' diversified needs, thereby promoting the consumption upgrading process in traditional markets [13].

2. The impact of FD on residents' consumption upgrading. Since Goldsmith first proposed the definition of FD in 1969, the relationship between FD and residents' consumption upgrading has attracted the attention of researchers. Financial liberalization is an important feature of FD because it can decrease residents' future uncertainty and reduce precautionary savings through international risk sharing, which is conducive to the stable growth of residents' consumption [14]. Globally, financial liberalization can reduce the short-run income elasticity of consumer expenditure and increase interest rate elasticity [15]. On the one hand, FD has gradually increased the number and types of financial derivatives that can both reduce fluctuations in consumption growth and stabilize residents' income. Moreover, the synergistic effect of financial market deepening and trade opening can improve the consumption-smoothing effect [16]. On the other hand, FD eases residents' credit constraints and reduces the proportion of consumers with limited mobility in the economy. Therefore, FD can play risk-diversifying and intertemporal consumption-smoothing roles, which are conducive to promoting the improvement of consumption quality [17,18].

3. The impact of new digital financial services on residents' consumption upgrading. There are limited comprehensive discussions regarding the DE, FD, and residents' consumption upgrading; most of the extant literature has studied residents' consumption upgrading from the single perspective of new digital financial services, such as digital finance and digital inclusive finance. Digital finance, which combines the Internet and finance, naturally embodies the characteristics of finance through its low cost and large range, which has a significant impact on residents' consumption. The emergence of digital finance has greatly expanded the scope of financial services, reduced liquidity constraints, and enabled residents excluded from financial services to achieve intertemporal consumption smoothing through financial services, thereby unlocking consumer demand [19]. Moreover, the development of digital finance can promote residents' consumption through convenient payments, whereas providing savings and subsidies for families can stimulate residents' basic consumption needs, thereby unlocking their consumption potential [20]. Ozili suggested that digital inclusive finance will be the main means of providing financial services in the future. Moreover, the Internet can serve the widest range of customers at the lowest cost, offer convenience to low-income groups and rural areas, and help curb the emergence of the financial exclusion phenomenon [21].

In summary, extant research has affirmed the positive role of the DE and FD in residents' consumption upgrading. However, most previous research has concentrated on unilaterally examining the effects of the DE or FD on residents' consumption upgrading or on examining the effects of digital finance, digital inclusive finance, and other DE and financial industry integration and innovation models on residents' consumption upgrading. Meanwhile, there are few empirical studies on the synergistic effect of the DE and FD on residents' consumption upgrading at the macro level, and there is also a lack of discussion on the common mechanism. Do the DE and FD have a synergistic effect on residents' consumption upgrading? What is the common action mechanism? These issues are yet to be explored. As an important branch in the field of economics, econometrics provides a theoretical basis and methodological tools for empirical research and quantitative analysis of economic management, mainly by using actual data of socio-economic activities as material, statistical analysis methods as means, and prediction and identification of cause–effect relationships as objectives. Due to the nonexperimental nature of socio-economic data, scientific research methods using econometric modeling and quantitative analysis are particularly important. On the one hand, econometrics is able to test the statistical significance of economic theories through scientific analysis of actual data; on the other hand, it provides a basis for scientific decision-making in policy implementation and policy evaluation through quantitative analysis of economic management models. Therefore, in order to concretize and quantify the above issues and present the research results clearly, this study uses econometric methods.

Based on a macro perspective, this study uses the panel data of 30 provinces in China from 2006 to 2021 (excluding Tibet, Hong Kong, Macao, and Taiwan due to the lack of data) to empirically analyze the impact of the DE and FD on residents' consumption upgrading. It assesses the impact and common mechanism and further discusses the heterogeneity and nonlinear characteristics.

3. Theoretical Analysis and Research Hypotheses

3.1. The Impact of the DE and FD on Residents' Consumption Upgrading

The construction of digital infrastructure and the rapid improvement of related supporting logistics systems have established a convenient and efficient online consumption network for residents, which can reduce their time spent offline shopping, improve their transaction efficiency and purchasing ability, and alter their consumption patterns [22]. The rapid development of the digital industry and the rise of digital platforms have gradually eliminated language restrictions and obstacles to the circulation of goods in space. Simultaneously, manufacturers have gradually expanded their service capabilities and enriched the types of consumer goods available [23]. Moreover, an increase in digital talent reserves can promote the formation of digital literacy in society, improve residents' digital capabilities, and improve the level of consumption expenditure (CL) [24]. Furthermore, digital platforms can organically combine entertainment and consumption, promote leisure consumption, increase the proportion of development- and enjoyment-oriented consumption expenditure, and effectively improve residents' consumption happiness [25].

As a result of financial expansion and the improvement in financial efficiency, the financial system is becoming increasingly ideal, and the quality of financial services has improved, enabling it to serve various fields of the real economy more effectively, which, in turn, can help promote residents' consumption upgrading. FD can accelerate the process of financial marketization, thereby intensifying competition among financial institutions, reducing the cost of financial intermediaries, lowering the threshold for consumer credit, easing the constraints on residents' mobility, and unlocking consumer demands [26]. Moreover, the development of financial derivatives has increased the supply of wealth management products, which can improve residents' expected income and financial asset allocation efficiency, effectively disperse risks, smooth consumption, and promote the improvement of consumption levels [27]. This is also conducive to a shift in residents' CS from food and clothing to development and enjoyment expenditures.

Accelerating the development of the DE will help expand the financial sector's scope of information collection and transmission and effectively reduce the cost of information transmission [28]. The DE can promote efficient linkages among multiple financial entities and enable financial institutions to identify and manage risks more effectively. Moreover, the DE can help alleviate the problem of financial exclusion, enable underdeveloped regions to enjoy financial services, solve the long-standing problem of insufficient financial services, and compensate for the lack of traditional financial services [29].

The investment cost of digital infrastructure construction is high, and the return period is long, obliging the financial industry to provide venture capital, private equity, and other financial support [30]. It is difficult for digital enterprises, especially small- and medium-sized digital enterprises, to obtain sufficient and stable cash flow at the initial stage. Consequently, financing difficulties restrict their growth. The financial industry's long-term financial support can play a powerful role in promoting the development of the digital industry [31]. The higher the degree of FD, the higher the scientific research and information technology (IT) practitioners' level of knowledge and the greater the consumers' understanding and use of financial products, which can help provide the talent pool required for the development of the DE [32].

The interactive integration and coordinated development of the DE with modern financial service formats have led to new digital financial services, represented by digital finance and digitally inclusive finance, which have significantly impacted residents' consumption upgrading. Digital financial services have the dual attributes of digital and

financial services, which can accelerate free circulation and effective allocation of capital, information, and other elements [33]. Their low cost, wide coverage, and convenience make the provision of financial services fairer and more efficient [34]. On the one hand, digital financial services use digital technology to lower the access threshold to financial services, thereby improving the services' inclusiveness and enabling disadvantaged groups to enjoy new financial services, which is conducive to alleviating liquidity constraints and stimulating consumption potential [35]. On the other hand, through a series of new payment methods, digital financial services enable consumption to overcome the limitations of time and space, reduce the transaction and time costs of financial services and consumption, and provide residents with additional funds and time for enjoyment- and development-oriented consumption [36].

Accordingly, the following research hypotheses are proposed:

H1. *The DE has a direct positive impact on residents' consumption upgrading.*

H2. *FD has a direct positive impact on residents' consumption upgrading.*

H3. *DE and FD have a synergistic effect on residents' consumption upgrading.*

3.2. Mediating Mechanisms for the Impact of the DE and FD on Residents' Consumption Upgrading

The rapid development of the DE is an important driving factor of industrial structure optimization. On the one hand, through industrial digitization, the DE is integrated with the entire industry chain in the form of digital technology, digital services, and digital information, thus transforming traditional industries into becoming intelligent and networked. This significantly improves the efficiency of resource allocation and labor productivity and accelerates the integration and upgrading process of the traditional industrial structure [37,38]. On the other hand, through digital industrialization, digital technologies represented by big data and cloud computing have gradually matured and become widely used, which has promoted the development of emerging industries, such as electronic information manufacturing, IT services, and the Internet industry. The vigorous development of emerging industries has promoted a shift in industrial focus to knowledge-intensive, intelligence-intensive, and technology-intensive directions and has increased the value of products, which supports the industrial structure to evolve to a higher level and quality [39].

FD is also a strong support for industrial structure optimization. As an important pillar of the tertiary industry, finance guides the continuous flow of capital to advantageous industries with high labor productivity and efficiency, eliminates financing constraints for development, and promotes the rational allocation of resources [40]. Through the collection and disclosure of information and the design of diversified investment tools, FD helps reduce the risk of information asymmetry in the development of emerging industries and promotes the improvement of financing efficiency [41]. Moreover, financial expansion and improved financial efficiency can enhance a region's ability to absorb industrial transfers and provide more space for regional industrial agglomeration [42,43].

Industrial structure optimization is generally considered a comprehensive manifestation of the rationalization and upgrading of the industrial structure. First, the rationalization of the industrial structure (RIS) measures the degree of production scale coordination among industries and the degree of effective utilization of production factors. The process of rationalizing the industrial structure can correct the distortion of factor allocation; promote the rational flow of labor, technology, knowledge, and other production factors and social resources; and promote high-quality economic growth, thus increasing residents' overall CL [44]. Second, the upgrading of the industrial structure (UIS) is manifested by changes in the proportion of the output value of the first, second, and third industries and the structural adjustment on the supply side. UIS can promote the continuous expansion of the effective supply scale and make the supply structure more sensitive towards and flexible in matching demand changes to meet residents' diverse and individual needs for

high-quality products and services. This will eventually increase the proportion of residents' enjoyment- and development-oriented consumption expenditures and promote the improvement of residents' CS [45]. Third, industrial structure optimization can effectively solve the structural problem of 'overcapacity' and promote the transfer of industrial development advantages from traditional industries, such as manufacturing and construction, to emerging service industries, such as entertainment, education, medical care, pensions, and cultural tourism [46]. Therefore, industrial structure optimization promotes residents' consumption upgrading and lifestyle changes through the development and expansion of emerging industries, optimization of product and service supply, and assistance in demand transformation.

Accordingly, the following hypotheses are proposed:

H4a. *Both the DE and FD can promote residents' consumption upgrading through RIS.*

H4b. *Both the DE and FD can promote residents' consumption upgrading through UIS.*

In summary, the impact and mechanism of the digital economy and financial development on residents' consumption upgrading can be deduced (see Figure 1).
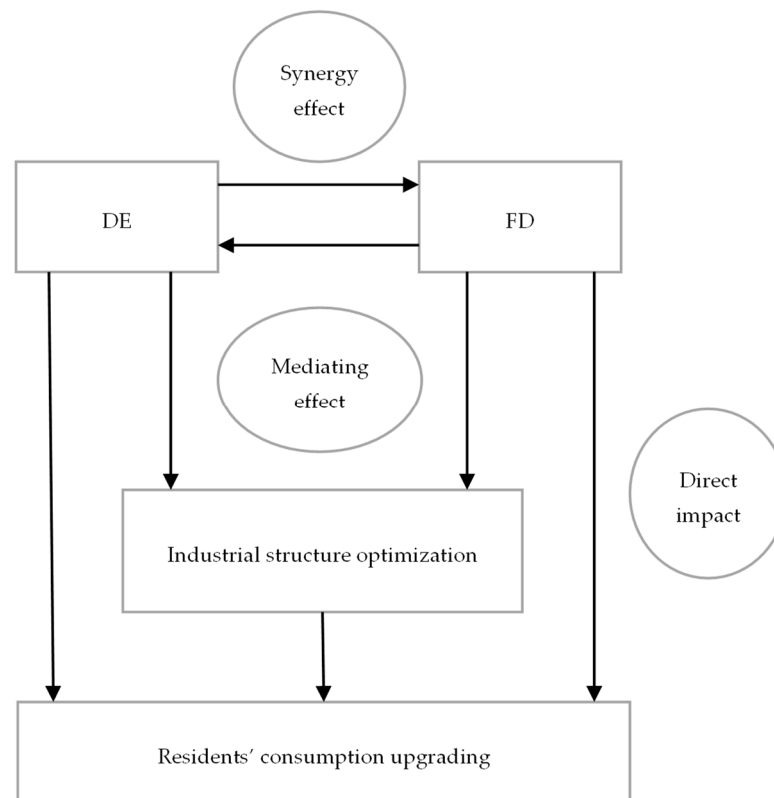
Figure 1. Diagram of the impact and mechanism of the digital economy and financial development of residents' consumption upgrading.

4. Methodology, Model Design, and Variable Selection

4.1. Methodology

First, this study used a panel data model to verify whether the DE and FD impacted residents' consumption upgrading and whether the effect was positive to provide a basis for the subsequent synergy analysis.

Second, this study used a synergy model to verify whether there was a synergistic effect of the DE and FD on residents' consumption upgrading and whether the effect was positive.

Third, this study used a mediating effects model to verify whether the DE and FD could promote residents' consumption upgrading through industrial structure optimization.

Finally, this study used a threshold model to verify whether the DE and FD had nonlinear characteristics in promoting residents' consumption upgrading in the process of new urbanization (NURB).

4.2. Models

4.2.1. Panel Data Model

In order to test the validity of the research hypotheses, this study first developed the following fundamental model to empirically examine the direct impact of the DE and FD on residents' consumption upgrading:

$$CL_{it} = \alpha_0 + \alpha_1 DE_{it} + \alpha_2 FD_{it} + \alpha_3 X_{it} + \varepsilon_{it} \tag{1}$$

$$CS_{it} = \beta_0 + \beta_1 DE_{it} + \beta_2 FD_{it} + \beta_3 X_{it} + \varepsilon_{it} \tag{2}$$

where i is the province code, t is time, CL is the level of consumption expenditure, CS is the consumption structure, DE is the development level of the digital economy, FD is the level of financial development, vector X is the series of control variables, and ε is the random disturbance term.

4.2.2. Synergy Model

Second, based on Equations (1) and (2), this study used a synergy model to discuss the synergistic effect of the DE and FD on residents' consumption upgrading. The specific models are as follows:

$$CL_{it} = \alpha_0 + \alpha_1 DE_{it} + \alpha_2 FD_{it} + \alpha_3 DE_{it} \times FD_{it} + \alpha_4 X_{it} + \varepsilon_{it} \tag{3}$$

$$CS_{it} = \beta_0 + \beta_1 DE_{it} + \beta_2 FD_{it} + \beta_3 DE_{it} \times FD_{it} + \beta_4 X_{it} + \varepsilon_{it} \tag{4}$$

To weaken multicollinearity, the interaction item was decentralized during the actual regression process.

4.2.3. Mediating Effect Model

The DE and FD can impact residents' consumption upgrading by affecting industrial structure optimization, including RIS and UIS. This study developed a mediating effect model for the empirical analysis, as shown in the following equations:

$$M_{it} = \gamma_0 + \gamma_1 DE_{it} + \gamma_2 X_{it} + \varepsilon_{it} \tag{5}$$

$$M_{it} = \delta_0 + \delta_1 FD_{it} + \delta_2 X_{it} + \varepsilon_{it} \tag{6}$$

$$CL_{it} = \varphi_0 + \varphi_1 DE_{it} + \varphi_2 M_{it} + \varphi_3 X_{it} + \varepsilon_{it} \tag{7}$$

$$CS_{it} = \theta_0 + \theta_1 DE_{it} + \theta_2 M_{it} + \theta_3 X_{it} + \varepsilon_{it} \tag{8}$$

$$CL_{it} = \lambda_0 + \lambda_1 FD_{it} + \lambda_2 M_{it} + \lambda_3 X_{it} + \varepsilon_{it} \tag{9}$$

$$CS_{it} = \eta_0 + \eta_1 FD_{it} + \eta_2 M_{it} + \eta_3 X_{it} + \varepsilon_{it} \tag{10}$$

where M represents the mediating variable, indicating industrial structure optimization.

4.2.4. Threshold Effect Model

To analyze the nonlinear threshold effect of the DE and FD on residents' consumption upgrading, this study considered the NURB as the threshold variable and set the threshold model according to Equations (3) and (4):

$$CL_{it} = \alpha_0 + \alpha_1 DE_{it} I(\omega_{it} \leq \mu) + \alpha_2 DE_{it} I(\omega_{it} > \mu) + \alpha_3 FD_{it} + \alpha_4 DE_{it} \times FD_{it} + \alpha_5 X_{it} + \varepsilon_{it} \quad (11)$$

$$CS_{it} = \beta_0 + \beta_1 DE_{it} I(\omega_{it} \leq \pi) + \beta_2 DE_{it} I(\omega_{it} > \pi) + \beta_3 FD_{it} + \beta_4 DE_{it} \times FD_{it} + \beta_5 X_{it} + \varepsilon_{it} \quad (12)$$

where ω is the threshold variable, μ and π are the thresholds to be estimated, and $I(\cdot)$ represents the indicative function. The value is 1, and is 0 if the conditions in parentheses are not satisfied.

This study only used the threshold effect model of the DE as an illustrative example; the threshold effect model of FD and the synergistic effect are not shown in detail. This study used a single-threshold model. Double- or multiple-threshold models can be extended based on the aforementioned model.

4.3. Variables

4.3.1. Dependent Variables

The dependent variable was residents' consumption upgrading. Consumption upgrading is a complex economic and social process. At present, academic circles have not yet formed a unified definition of consumption upgrading. In the related research [47], consumption upgrading is considered to include both the expansion of the 'quantity' and the improvement of the 'quality' of residents' consumption. It is a process in which the rising trend of the CL over time and the development and change in the CS from low to high levels are coordinated and unified. Therefore, based on the connotation of consumption upgrading, this study measured residents' consumption upgrading from the CL and CS perspectives.

CL refers to the degree of expansion of the 'quantity' of consumption upgrading, which is mainly reflected in the overall increase in residents' consumption expenditure and the improvement of their consumption capacity [48]. This study divided the per capita consumption expenditure of urban and rural residents by the consumer price index (CPI) to obtain the per capita actual consumption expenditure and used its natural logarithm to measure the CL.

CS refers to the optimization level of the 'quality' of consumption upgrading, which is mainly manifested in the transformation of residents' consumption from survival-oriented to enjoyment-oriented and development-oriented consumption patterns [49]. This study used the proportion of development- and enjoyment-oriented consumption to the total consumption expenditure of urban and rural residents to measure the CS. According to the National Bureau of Statistics of China's classification of resident consumption, clothing, food, and housing are subsistence-oriented consumption expenditures. Transportation and communication, healthcare, culture, and education are development-oriented consumption expenditures. Culture, education, entertainment, tourism, household equipment, and durable goods are enjoyment-oriented consumption expenditures. Owing to the rapid increase in housing prices in China, this study excluded housing consumption from the per capita consumption expenditure to eliminate the impact of rising housing prices on CS.

4.3.2. Independent Variables

The core independent variables were the development levels of the DE and FD. The continuous improvement of digital infrastructure construction, represented by 5G, data centers, and industrial internet, has enhanced the vitality of the DE and provided strong support for the development of the DE. The digital industry, namely, the information and communication industry, is the pioneer industry of the DE and represents the development direction of a new generation of information technology. The development of the digital

industry is often regarded as the key to unleashing the economic driving force of the DE. Digital talents with a digital mindset and high digital literacy are some of the important factors contributing to the growth of the DE and are the core competitiveness of digital transformation. Drawing on previous theoretical analyses [50], this study developed an index evaluation system based on three dimensions: digital infrastructure, digital industry development, and digital talent (see Table 1). The data were standardized, and the dimensionality was reduced using the entropy method to estimate the DE.

Table 1. Index system of the DE's development level.

Primary Indicators	Secondary Indicators	Measurement Indicators
DE	Digital infrastructure (0.3105)	Mobile phone penetration rate (0.0183)
		Number of Internet access ports (0.0531)
		Number of mobile phone base stations (0.0237)
		Density of optical cable construction (0.132)
		Rate of computer usage (0.0307)
		Rate of enterprise website construction (0.0073)
		Proportion of IT enterprises (0.0454)
	Digital industry development (0.5301)	Proportion of total software business revenue (0.1227)
		Proportion of total telecom business (0.0569)
		Proportion of revenue from IT services (0.1165)
		Proportion of e-commerce sales (0.0581)
		Proportion of e-commerce purchases (0.0672)
		Proportion of express business revenue (0.1087)
	Digital talent (0.1596)	Proportion of information practitioners (0.0552)
		Number of ordinary colleges and universities (0.026)
		Number of degrees awarded in higher education (0.0364)
		Proportion of scientific research and technical service personnel (0.042)

Note: The values in parentheses are the normalized weights calculated using the entropy method.

The financial interrelations ratio (FIR) is the ratio of total existing financial assets to national wealth at a given point in time. It reflects not only the degree of financial deepening but also changes in the structure of financial assets, and is a basic indicator of the level of financial development.

$$\text{FIR} = \frac{F_r}{W_r} \tag{13}$$

where F_r is the total existing financial assets and W_r is the national wealth.

It is usually simplified as the ratio of total deposits and loans of financial institutions to the gross domestic product (GDP) [51].

4.3.3. Mediator Variables

From the perspective of the composition of industries and the relationship between them, this study selected two mediator variables—RIS and UIS—to explore the common mechanism of the DE and FD that could promote residents' consumption upgrading:

$$\text{RIS} = 1 \Big/ \sum_{i=1}^{n} (Y_i/Y) \left| \left(\frac{Y_i}{L_i}\right) \Big/ \left(\frac{Y}{L}\right) - 1 \right| \tag{14}$$

$$\text{UIS} = \sum_{i=1}^{n} \frac{Y_i}{Y} \times i \tag{15}$$

where Y is the total output value, L is the total number of employees, i represents the industrial sector, and n represents the number of industries (n = {1, 2, 3}).

The larger the RIS and UIS values, the more reasonable and advanced the industrial structure.

4.3.4. Threshold Variable

The threshold variable was the NURB level. NURB not only attaches importance to expanding the scale of towns and cities but also focuses on improving the quality of urban construction and urban service functions. Population urbanization is the basic driving force, economic urbanization is an important support for the construction of NURB, spatial urbanization is the carrier, social urbanization is an important embodiment of people-oriented nature, environmental urbanization reflects the ability of NURB to develop sustainably, and urban-rural integration is the core connotation. Drawing on previous theoretical analyses [52], to avoid the one-sidedness of previous measurements using a single indicator, this study established an index evaluation system based on six dimensions: population urbanization, economic urbanization, spatial urbanization, social urbanization, environmental urbanization, and urban and rural integration (see Table 2). The data were standardized, and the dimensionality was reduced using the entropy method to estimate the NURB level.

Table 2. Index system of the NURB level.

Primary Indicator	Secondary Indicators	Measurement Indicators
NURB	Population urbanization (0.1149)	Urban population density (0.0523)
		Proportion of urban population (0.0422)
		Rate of registered urban unemployment (0.0204)
	Economic urbanization (0.239)	GDP per capita (0.0877)
		Ratio of the second and third output values (0.0171)
		Urban fixed asset investment (0.1342)
	Spatial urbanization (0.277)	Urban road area per capita (0.0432)
		Length of city road (0.1337)
		Urban built-up area (0.1001)
	Social urbanization (0.1944)	Penetration of city gas (0.016)
		Number of beds in health institutions (0.0984)
		Rate of urban water consumption (0.08)
	Environmental urbanization (0.1429)	Green area in the park per capita (0.045)
		Green coverage rate of built-up areas (0.0181)
		Rate of forest coverage (0.0798)
	Urban and rural integration (0.1038)	Per capita consumption expenditure ratio of urban and rural residents (0.0512)
		Per capita disposable income ratio of urban and rural residents (0.0526)

Note: The values in parentheses are the normalized weights calculated using the entropy method.

4.3.5. Control Variables

Based on the selection of control variables provided in the literature [53–55] and to ensure the reliability of the measurement results, this study controlled for six variables. The first was the income level, expressed as the per capita disposable income of urban and rural residents. The second was the rate of urbanization, expressed as the proportion of the urban population to the total population at the end of the year. The third was government intervention, expressed as the ratio of local fiscal expenditure to GDP. The fourth was

opening up, expressed as the ratio of total imports and exports to GDP. The fifth was education level, expressed as the number of college students per 100 people. The sixth was social security, expressed as the proportion of people participating in social insurance to the total number of people. This study divided income level by the CPI and used its natural logarithm to eliminate possible heteroscedasticity.

4.4. Data Sources and Statistical Description

The data were primarily sourced from the China Science and Technology Statistical Yearbook, China Labor Statistical Yearbook, China Statistical Yearbook, and provincial (municipal and district) statistical yearbooks. Considering the effects of inflation, this study converted the price-related variables to 2006 prices based on the corresponding price index. Table 3 provides statistical descriptions of all variables.

Table 3. Statistical descriptions of variables.

Type	Variable Name	Sample Size	Average Value	Standard Deviation	Min	Max
Dependent variables	CL	480	4.878	0.358	4.163	5.845
	CS	480	0.501	0.047	0.364	0.614
Independent variables	DE	480	0.156	0.098	0.045	0.703
	FD	480	3.097	1.040	1.445	7.293
Mediator variables	RIS	480	0.635	0.180	0.043	0.953
	UIS	480	2.368	0.130	2.111	2.834
Threshold variable	NURB	480	0.335	0.105	0.155	0.732
Control variables	Income	480	5.245	0.394	4.489	6.351
	Urb	480	0.564	0.137	0.275	0.896
	Gov	480	0.243	0.109	0.095	0.758
	Open	480	0.302	0.343	0.007	1.712
	Edu	480	2.549	0.953	0.700	6.750
	Sose	480	0.546	0.316	0.063	1.108

5. Empirical Testing and Analysis

5.1. Basic Regression Analysis

Table 4 displays the effect of the DE and FD on the CL and CS. The Hausman test findings suggested that a fixed-effects model was preferable to a random-effects model. Therefore, this study used a fixed-effects model to estimate the study parameters.

The results show that the DE regression coefficient is significantly positive, indicating that it has a significantly positive impact on residents' consumption upgrading. The development level of the DE significantly promotes an increase in the CL and also promotes the optimization of the CS. The DE considers digital knowledge and information as the core production factor, modern information networks and other infrastructure as important carriers, digital technology as the support point for industrial development, and digital talent as the backup force and original driving force for innovation. It brings new products, formats, and models to the traditional consumer market and promotes the optimization and upgrading of the traditional CS. Thus, H1 is verified.

The FD regression coefficient is significantly positive, indicating that it has a significant positive impact on residents' consumption upgrading. FD has a positive effect on the expansion of residents' consumption expenditure and also promotes the increase in the proportion of enjoyment- and development-oriented consumption expenditure. By expanding the financial scale and continuously improving financial efficiency, FD eases residents' credit and liquidity constraints, improves payment convenience, and helps to meet residents' multilevel consumption needs, thereby promoting consumption upgrading. Thus, H2 is verified.

Table 4. Baseline regression results.

Variables	CL	CS
DE	0.213 *** (0.048)	0.092 ** (0.034)
FD	0.045 ** (0.015)	0.011 *** (0.002)
Income	0.039 *** (0.006)	0.008 ** (0.003)
Urb	0.252 ** (0.130)	0.052 * (0.028)
Gov	0.051 ** (0.018)	0.026 ** (0.005)
Open	0.013 * (0.006)	0.061 ** (0.024)
Edu	0.039 ** (0.012)	0.012 * (0.008)
Sose	0.064 *** (0.019)	0.016 ** (0.007)
Constant	3.886 *** (0.802)	0.267 *** (0.039)
Year	Yes	Yes
Province	Yes	Yes
N	480	480
R^2	0.979	0.809

Note: *, **, *** mean significant at the 10%, 5%, and 1% levels, with standard errors in parentheses.

5.2. Endogeneity Test

To avoid possible endogeneity problems in the model in the empirical analysis, this study adopted the instrumental variable (IV) method. Specifically, this study followed the method of Sun and Tang [34] and selected the number of fixed telephones per 10,000 people in 1984 as an IV of the DE. First, the continuous development of traditional communication technology has established an important foundation for the emergence of the Internet. The technical level and usage habits of telecommunication infrastructure in the past have affected the application of modern Internet technology. This makes the IV relevant. Second, traditional telecommunication tools, such as fixed telephones, are gradually being eliminated from the residents' consumption process. This makes the IV exclusive. Because this study's samples were from balanced panel data, the selected IV concerned cross-sectional data. Since empirical testing of panel data cannot be performed directly, this study multiplied the number of users with Internet broadband access in China in the previous year by the number of fixed telephones per 10,000 people in 1984 and used it as an IV for the DE of each province in that year. Simultaneously, this study used FD lagged by one period as an IV. The endogeneity test results are presented in Tables 5 and 6.

After controlling for endogenous factors, there is a promotional effect of the DE and FD on residents' consumption upgrading. Overall, the model settings used herein are reasonable.

Table 5. Endogenous test results of the DE.

Variables	CL		CS	
	(1)	**(2)**	**(3)**	**(4)**
DE	0.527 ***	0.959 ***	0.098 **	0.351 ***
	(0.205)	(0.353)	(0.042)	(0.131)
Control variables	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Kleibergen-Paap rk LM statistics	8.689	9.935	8.689	9.935
	[0.003]	[0.002]	[0.003]	[0.002]
Kleibergen-Paap rk Wald F statistics	55.126	34.372	55.126	34.372
	{16.38}	{16.38}	{16.38}	{16.38}
N	480	480	480	480
R^2	0.976	0.976	0.774	0.769

Note: The value in [ ] is the *p* value, and the value in { } is the critical value at the 10% level of the Stock–Yogo weak recognition test. ** and *** mean significant at the 5% and 1% levels, with standard errors in parentheses.

Table 6. Endogenous test results of FD.

Variables	CL		CS	
	(1)	**(2)**	**(3)**	**(4)**
FD	0.040 ***	0.052 ***	0.016 ***	0.014 ***
	(0.008)	(0.010)	(0.004)	(0.004)
Control variables	No	Yes	No	Yes
Year	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Kleibergen-Paap rk LM statistics	58.951	42.893	58.951	42.893
	[0.000]	[0.000]	[0.000]	[0.000]
Kleibergen-Paap rk Wald F statistics	240.130	156.622	240.130	156.622
	{16.38}	{16.38}	{16.38}	{16.38}
N	450	450	450	450
R^2	0.976	0.976	0.787	0.823

Note: The value in [ ] is the *p* value, and the value in { } is the critical value at the 10% level of the Stock–Yogo weak recognition test. *** means significant at the 1% levels, with standard errors in parentheses.

5.3. Robustness Tests

To verify the reliability of the regression results listed above, this study chose three robustness testing methods: replacement of the core independent variables, replacement of the dependent variables, and elimination of municipalities. First, this study used the proportion of fixed asset investment in the information transmission, software, and IT service industry of the total fixed asset investment of the whole society (ITS) as a substitute indicator for the DE, and it used the proportion of the value added of the financial industry in GDP in each region (VAFS) as a substitute indicator for FD. Second, this study used the natural logarithm of the actual per capita retail sales of social consumer goods (Retail) as a proxy variable for the CL and Engel's coefficient (Engel) as a proxy variable for the CS. Finally, although the administrative status of a municipality is the same as that of a province, its jurisdictional area is equivalent to that of a prefecture-level city, and it often has a larger built-up area, a larger population, and a more important political and economic status. This study excluded Beijing, Tianjin, Shanghai, and Chongqing from the data.

Table 7 presents the robustness test results. These results are mostly consistent with those calculated above, indicating that the research results are relatively robust.

Table 7. Robustness tests.

Variables	CL	CS	Retail	Engel	CL	CS
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
DE			0.230 *	−0.074 **	0.289 **	0.162 **
			(0.147)	(0.028)	(0.092)	(0.053)
FD			0.085 ***	−0.008 **	0.045 ***	0.011 ***
			(0.026)	(0.003)	(0.015)	(0.001)
ITS	0.417 ***	0.277 **				
	(0.013)	(0.126)				
VAFS	1.086 ***	0.203 **				
	(0.246)	(0.095)				
Income	0.092 ***	0.011 *	0.089 ***	−0.039	0.095 ***	0.010 **
	(0.009)	(0.006)	(0.013)	(0.058)	(0.010)	(0.003)
Urb	0.324 **	0.082 **	1.092 **	−0.084 *	0.458 **	0.149 **
	(0.137)	(0.029)	(0.536)	(0.057)	(0.234)	(0.071)
Gov	0.024 **	0.007	1.084 ***	−0.048 ***	0.198 ***	0.052 **
	(0.012)	(0.055)	(0.267)	(0.013)	(0.041)	(0.021)
Open	0.013 *	0.079 ***	0.466 ***	−0.003	0.048 **	0.089 ***
	(0.008)	(0.024)	(0.127)	(0.019)	(0.019)	(0.031)
Edu	0.003 **	0.008 ***	0.008	−0.005 ***	0.047 ***	0.006 ***
	(0.001)	(0.003)	(0.034)	(0.001)	(0.014)	(0.002)
Sose	0.008 **	0.012 **	0.088 **	−0.008 ***	0.013 ***	0.037 **
	(0.004)	(0.005)	(0.031)	(0.002)	(0.002)	(0.016)
Constant	3.608 ***	0.235 ***	3.019 ***	0.466 ***	3.237 ***	0.103 ***
	(0.930)	(0.041)	(0.789)	(0.032)	(0.957)	(0.024)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes	Yes	Yes
N	480	480	480	480	416	416
R^2	0.978	0.805	0.894	0.901	0.980	0.841

Note: *, **, *** mean significant at the 10%, 5%, and 1% levels, with standard errors in parentheses.

5.4. Synergy Analysis

As shown in Table 8, the influence coefficients of the DE, FD, and their interaction item on residents' consumption upgrading are significantly positive, indicating that the DE and FD not only individually affect residents' consumption upgrading but also have a synergy effect of '1 + 1 > 2', thus forming a mutual promotion effect and synergistically empowering consumption upgrading. FD provides support for digital infrastructure, credit support for digital industry development, and intellectual support for digital talent reserves. The DE supports the financial industry in establishing efficient information-sharing channels, provides data technology support for financial institutions to identify risks, and enhances the availability and frequency of financial services. The coordinated development of the DE and finance has greatly improved the financial means for ordinary people and reduced the uncertainty of their future cash flow. Simultaneously, it has enabled changes in payment methods, accelerated consumption decisions, facilitated residents' consumption, and promoted consumption upgrading. Thus, H3 is verified.

Table 8. Synergy test results.

Variables	CL	CS
DE	0.141 *** (0.021)	0.053 * (0.034)
FD	0.038 ** (0.014)	0.010 *** (0.002)
DE × FD	0.081 ** (0.039)	0.044 ** (0.017)
Constant	3.530 *** (0.845)	0.214 *** (0.038)
Control variables	Yes	Yes
N	480	480
R^2	0.979	0.812

Note: *, **, *** mean significant at the 10%, 5%, and 1% levels, with standard errors in parentheses.

5.5. Mechanism Analysis

As shown in Tables 9 and 10, the impact coefficients of the DE and FD on RIS and UIS are both significantly positive, indicating that both the DE and FD can significantly promote the industrial structure optimization process. The impact coefficients of RIS and UIS on residents' consumption upgrading are significantly positive, indicating that promoting industrial structure optimization is conducive to increasing residents' consumption expenditure and improving the CS. The application of digital technology in various stages of production and circulation has promoted the deep integration and innovative development of the DE, the traditional agricultural industry, and the service industry; improved resource allocation efficiency; accelerated the transfer of production factors to high-end industries; and promoted the continuous optimization of the industrial structure. Healthy and sustainable development of finance can guide the rational allocation of economic resources and reduce enterprises' financing costs. With the growth of the total financial scale and the improvement of the financial structure, the mobility of financial capital among various industries increases, which, in turn, promotes the optimization of the industrial structure. Industrial structure optimization promotes the effective conversion of market-oriented supply and demand, which supports the large-scale production and diverse development of enterprises and optimizes and improves the quality of products and services, thereby creating new consumer demands and helping urban and rural residents' consumption upgrading.

Table 9. Mechanism test results of RIS.

Variables	RIS		CL		CS	
	(1)	(2)	(3)	(4)	(5)	(6)
DE	0.654 *** (0.095)		1.780 *** (0.145)		0.160 *** (0.034)	
FD		0.061 *** (0.010)		0.101 *** (0.013)		0.017 *** (0.003)
RIS			0.729 *** (0.067)	0.922 *** (0.072)	0.029 * (0.016)	0.033 ** (0.017)
Constant	0.180 ** (0.091)	−0.020 (0.078)	3.704 *** (0.916)	3.144 *** (0.720)	0.279 *** (0.034)	0.251 *** (0.032)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
N	480	480	480	480	480	480
R^2	0.716	0.706	0.867	0.815	0.456	0.457

Note: *, **, *** mean significant at the 10%, 5%, and 1% levels, with standard errors in parentheses.

Table 10. Mechanism test results of UIS.

Variables	UIS		CL		CS	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
DE	0.739 *** (0.050)		1.997 *** (0.190)		0.123 *** (0.041)	
FD		0.055 *** (0.006)		0.105 *** (0.017)		0.014 *** (0.004)
UIS			0.351 *** (0.111)	0.945 *** (0.123)	0.075 ** (0.030)	0.089 *** (0.026)
Constant	1.904 *** (0.602)	1.672 *** (0.318)	3.167 *** (0.352)	1.545 *** (0.242)	0.161 *** (0.059)	0.101 ** (0.042)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
N	480	480	480	480	480	480
R^2	0.789	0.735	0.831	0.782	0.462	0.470

Note: ** and *** mean significant at the 5% and 1% levels, with standard errors in parentheses.

5.6. Regional Heterogeneity Analysis

China is a vast territory with significant regional differences in terms of natural conditions, factor endowment, technological capacity, and economic development level. The statuses of the DE and FD also differ. Therefore, it is necessary to further verify the impact of the DE and FD on residents' consumption upgrading in different regions.

To make the regional heterogeneity division more intuitive, this study selected three time periods, 2006, 2014, and 2021, and used ArcGIS 10.8 software to show the DE and FD in 30 provinces in China in the form of maps (shown in Figures 2 and 3). Figure 2 demonstrates that there are very noticeable regional differences in DE development processes. For instance, the level of the DE has been relatively high in China's eastern coastal region, and it has also recently experienced rapid growth in the central and western regions. Figure 3 demonstrates that there are also very noticeable regional differences in FD.
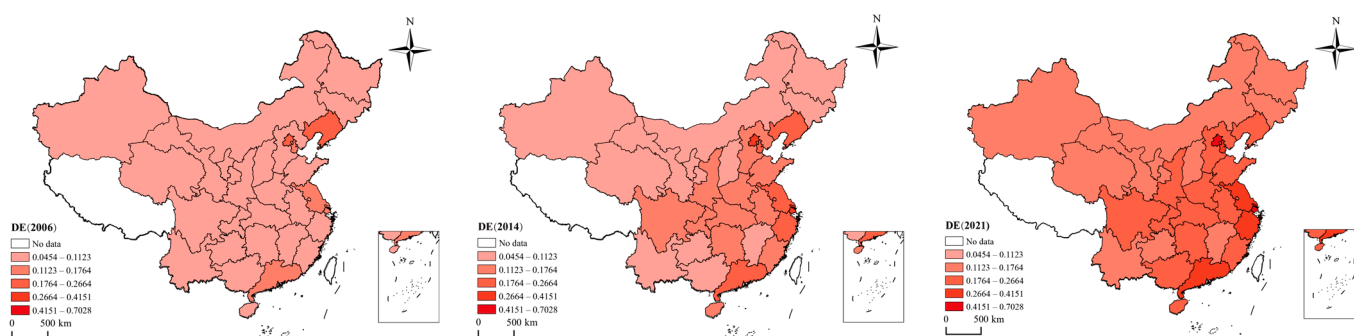

Figure 2. Level of the DE in China in 2006 (**left**), 2014 (**middle**), and 2021 (**right**). Note: This map is based on the standard map (review number: GS (2019)1823) of the standard map service system of the Ministry of Natural Resources of China. The base map is unmodified. Figure 3 is the same.

Accordingly, this study divided the full sample into three subsamples—the eastern, central, and western regions—to study the regional differences in the impact of the DE and FD on residents' consumption upgrading. Specifically, the eastern region includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan; the central region includes Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan; and the western region includes Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.
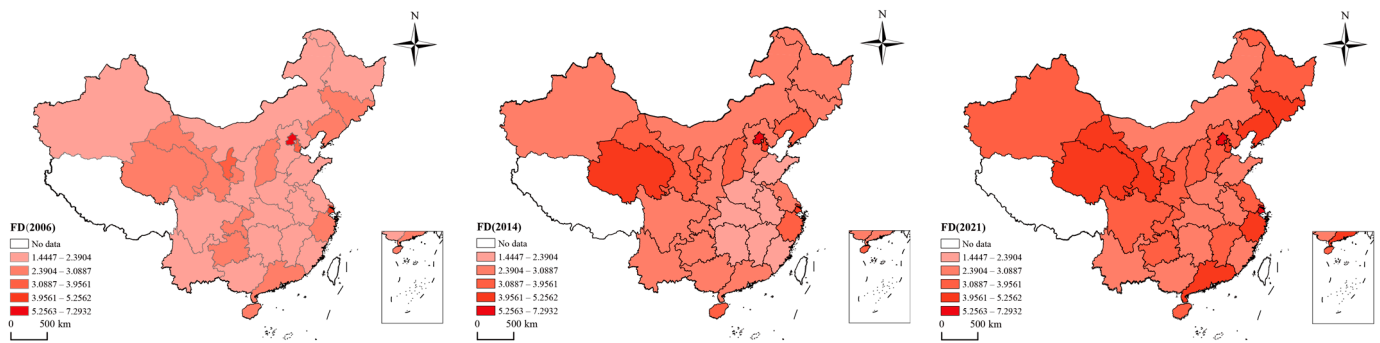
Figure 3. Level of FD in China in 2006 (**left**), 2014 (**middle**), and 2021 (**right**).

As Table 11 shows, there are significant regional differences in the promotional effects of the DE, FD, and their synergistic effect on residents' consumption upgrading. The promotional effect of the DE is more significant in the central and western regions. This may be because the digital technology in the eastern region has matured, the economy is more developed, and DE dividends have been fully unlocked. The DE has surpassed the period of rapid development and is now in the stage of high-quality development. Therefore, the unilateral role of the DE in promoting residents' consumption upgrading in the eastern region is limited. The DE in the central and western regions is in a stage of rapid development, and the effect of the DE on empowering residents' consumption upgrading is more obvious.

Table 11. Regional heterogeneity test results.

Variables	CL			CS		
	East	Middle	West	East	Middle	West
DE	0.119 **	0.182 ***	0.175 ***	0.027 ***	0.087 ***	0.073 ***
	(0.056)	(0.035)	(0.063)	(0.008)	(0.031)	(0.025)
FD	0.054 ***	0.035 **	0.027 **	0.019 **	0.009 ***	0.006 **
	(0.013)	(0.016)	(0.012)	(0.009)	(0.002)	(0.003)
DE × FD	0.085 **	0.164 **	0.071 ***	0.094 *	0.035 ***	0.049 *
	(0.029)	(0.052)	(0.031)	(0.052)	(0.008)	(0.030)
Constant	3.941 ***	3.701 ***	3.807 ***	0.237 **	0.202 ***	0.208 ***
	(0.883)	(0.860)	(0.925)	(0.117)	(0.046)	(0.068)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
N	176	128	176	176	128	176
R^2	0.942	0.955	0.931	0.488	0.836	0.703

Note: *, **, *** mean significant at the 10%, 5%, and 1% levels, with standard errors in parentheses.

The promotional effect of FD on residents' consumption upgrading is more significant in the eastern region. This may be because the level of FD in the central and western regions is low, the number of financial institutions is small, and the inclusiveness of financial services is poor; these factors are inconducive to narrowing the gap between urban and rural consumption expenditure. The financial industry in the eastern region is relatively developed, the financial market system is more complete, and the construction of the financial information service system is mature, all of which are conducive to stimulating residents' consumption needs.

Regional differences in the synergistic effect on the promotion of residents' consumption upgrading are uncertain. On the one hand, in terms of CL, the synergistic effect on the promotion of residents' consumption upgrading in the central region is significantly greater than that in the eastern and western regions. This may be because the inclusive effect of digital financial services in the eastern region has been fully exerted, and the development of digital financial services has entered a stable period. Constrained by the

relatively difficult construction of digital infrastructure and the limited coverage of financial services in the western region, the ability of digital financial services to promote residents' consumption upgrading has not been fully utilized. The construction of digital infrastructure in the central region has been partially completed, the financial system has been continuously optimized, and digital financial services are in a stage of rapid development. On the other hand, regarding the CS, the positive synergistic effect on the improvement of residents' CS in the eastern region is significantly greater than that in the central and western regions. This may be because the eastern region has stronger digital technology innovation capability and richer financial resources. New products and digital financial services can prioritize benefitting local residents and improving their CS.

5.7. Urban–Rural Heterogeneity Analysis

China has had a dual urban–rural economic structure for a long time. The urban economy, dominated by modern industrialized production, coexists with the rural economy, which is dominated by a small-scale peasant economy. The urban economic development level is much higher than that of the rural areas. Therefore, urban–rural differences should be examined. Specifically, we divided the per capita consumption expenditure of urban and rural residents into that of urban residents and that of rural residents. We divided the proportion of development- and enjoyment-oriented consumption to the total consumption expenditure of urban and rural residents into that of urban residents and that of rural residents.

As shown in Table 12, the DE, FD, and their synergistic effect have significant urban–rural heterogeneity in promoting residents' consumption upgrading. Possible reasons for this are as follows:

Table 12. Urban–rural heterogeneity test results.

Variables	CL		CS	
	Urban	Rural	Urban	Rural
DE	0.122 ***	0.169 ***	0.047 *	0.058 **
	(0.037)	(0.048)	(0.028)	(0.030)
FD	0.034 *	0.045 **	0.006 **	0.018 ***
	(0.018)	(0.025)	(0.003)	(0.005)
DE × FD	0.075 **	0.096 *	0.039 *	0.051 **
	(0.032)	(0.052)	(0.022)	(0.021)
Constant	3.976 ***	2.784 ***	0.342 **	0.291 ***
	(0.936)	(0.505)	(0.137)	(0.036)
Control variables	Yes	Yes	Yes	Yes
N	480	480	480	480
R^2	0.921	0.953	0.799	0.865

Note: *, **, *** mean significant at the 10%, 5%, and 1% levels, with standard errors in parentheses.

First, the development of the DE has shaped digital and intellectual consumption patterns, stimulated the consumption potential of rural residents through platforms such as digital poverty alleviation, rural e-commerce, and social e-commerce, and improved the level of consumption [56]. Second, due to the gradual improvement of the rural financial system and the relaxation of the conditions of entry for financial enterprises, more financial institutions have sunk into rural areas, thereby expanding the coverage of rural finance and optimizing rural consumers' credit products [57]. Finally, financially disadvantaged groups, such as rural residents, are usually unable to pass formal financial institutions' credit review thresholds and are unable or unwilling to bear the cost of financial services. Digital financial services have changed the credit logic of traditional financing and reduced rural residents' consumption budgets and liquidity constraints [58]. However, for urban residents, consumption resources are relatively abundant, mobile payments have been popularized, the financial system has improved, and digital financial services cover a wide

range. Therefore, the improvement effects of the DE, FD, and their synergistic effect are relatively small.

5.8. Threshold Effect Analysis

Before we estimated the threshold effect model, it was necessary to test for the existence of a threshold effect. The threshold effect values were obtained from repeated sampling (300 times) via bootstrapping. The threshold test results are shown in Table 13.

Table 13. Threshold test results.

Dependent Variables	Independent Variables	Threshold Model	F-Statistic	Threshold Values
CL	DE	Single	43.01 ***	0.3958
		Double	24.64	0.4214
	FD	Single	37.03 **	0.3558
		Double	16.80	0.4349
	DE × FD	Single	7.42	0.4813
CS	DE	Single	21.80	0.5359
	FD	Single	20.83	0.5359
	DE × FD	Single	27.26 *	0.3635
		Double	15.56	0.5467

Note: *, **, *** mean significant at the 10%, 5%, and 1% levels, with standard errors in parentheses.

The regression results of the threshold-effect model are shown in Table 14. When the dependent variable is the CL, the DE regression coefficients are all positive and significantly increase after crossing the NURB threshold. This shows that the development of the DE has a positive impact on the increase in residents' consumption expenditure, and after the construction of the NURB reaches a certain stage, its positive impact is significantly enhanced. This is because the NURB is driven by a new generation of digital IT, which drives the upgrading of urban industries, increases the abundance of products and services, and improves the quality of products and services. Simultaneously, it accelerates the transformation of urban farmers' citizenization and creates favorable conditions for the improvement of residents' overall digital literacy. The FD coefficient is positive but insignificant when the NURB does not cross the threshold; the coefficient increases and becomes significant after crossing the threshold. This shows that in the initial NURB stage, the role of FD in promoting residents' consumption expenditure is not apparent. After the construction of the NURB reaches a higher stage, the effect of FD on promoting an increase in residents' consumption expenditure gradually emerges. The NURB improves the inclusiveness of FD, broadens the boundaries of financial services, enhances the availability of financial products, and opens the 'last mile' for urban and rural residents who have had previous difficulties accessing financial services, thereby unlocking consumer demand.

When the dependent variable is the CS, the regression coefficient of the synergistic effect is positive but not significant when the threshold value is not crossed; after crossing the threshold value, the coefficient increases and becomes significant. This indicates that, in the early stage of the construction of the NURB, the synergistic effect has a limited promotion effect on the improvement of the residents' CS, and as the construction of the NURB gradually advances, the promotion effect is significantly enhanced. The construction of the NURB has an agglomeration effect on labor, capital, and industry, which can drive financial expansion, adjust the financial structure, and accelerate digital technology innovation. Simultaneously, the promotion of the NURB accelerates the flow of production factors from urban to rural areas, which aids the narrowing of the urban–rural digital divide, transforming the digital divide into digital dividends, promoting the coordinated development of the DE and finance, and improving the quality of residents' consumption upgrading.

Table 14. Threshold regression results.

Variables		CL		CS
DE	(NURB ≤ 0.3958)	0.102 *** (0.032)		
	(NURB > 0.3958)	0.168 *** (0.029)		
FD	(NURB ≤ 0.3558)		0.008 (0.006)	
	(NURB > 0.3558)		0.012 ** (0.005)	
DE × FD	(NURB ≤ 0.3635)			0.039 (0.033)
	(NURB > 0.3635)			0.051 *** (0.012)
Constant		3.610 *** (0.974)	3.515 *** (0.876)	0.237 *** (0.049)
Control variables		Yes	Yes	Yes
N		480	480	480
R^2		0.912	0.913	0.686

Note: ** and *** mean significant at the 5% and 1% levels, with standard errors in parentheses.

6. Discussion and Conclusions

6.1. Discussion

There are numerous indicators of the DE. Limited by the scope of the research, research perspective, and data availability, as of yet there is no authoritative and unified indicator system. Compared with previous studies, this study adds digital talent to the indicator system of the DE in order to measure the DE more comprehensively. The digital economy industry can be divided into digital industrialization and industrial digitization, which was been summarized in this study as digital industrial development, simplifying the indicators so that they are not ponderous.

Many previous studies mostly use digital finance and digital inclusive finance as independent variables, which are representative but fail to reflect the interaction between the DE and FD, ignoring the impact of other new digital financial service models, such as consumer finance and fintech, on residents' consumption upgrading. By introducing the DE, FD, and their interaction item into the econometric model, this study found that the DE and FD promoted residents' consumption upgrading and had a synergistic effect. Li et al. [59] and Song et al. [60] conducted research based on the China Household Finance Survey from a micro perspective, and their results were consistent with the conclusions of this study. Furthermore, this study explored the common mechanism of the DE and FD and found that the mediating effect of industrial structure optimization was obvious. This conclusion confirms the need to implement a strategy to expand domestic demand.

Compared to using digital finance to directly represent the synergistic effect, this study more effectively reflected the interaction between the DE and FD by examining the synergistic effect through the interaction item. This is a helpful strategy to clarify the mutual promotion effect between the DE and FD, which can provide a reference for the formulation of related policies. However, more econometric models for testing the synergistic effect between variables should be developed. Furthermore, when comparing this study's results to those of older studies, it must be noted that industrial structure optimization is a common mechanism through which the DE and FD affect residents' consumption upgrading and is similar to the results reported previously [61]. However, additional macro-level mechanisms should be explored.

This study examines the regional and urban–rural heterogeneity of the effects of DE and FD on the consumption upgrading of residents, which was performed after dividing the sample. The heterogeneity of consumer goods categories could be an interesting point

of study to decipher whether the DE and FD and their synergistic effects are stronger promoters of development-oriented consumption or enjoyment-oriented consumption.

Through empirical analysis using a threshold effect model, this study found that the impact of the DE and FD on residents' consumption upgrading had a nonlinear threshold effect. When the NURB level exceeded a certain threshold, the DE and FD promoted the increase an consumer expenditure, and the synergistic effect promoted CS improvement. Wang et al. [56] consider education as a threshold variable and concluded that the effects of the DE and FD on farmers' consumption are nonlinear. By considering the NURB as a threshold variable, this study provides new empirical evidence of the nonlinear impact of the DE and FD on residents' consumption upgrading. These findings can enrich research in this field to some extent, although the threshold effect of other variables should be further explored.

6.2. Conclusions

Consumption upgrading is a 'ballast stone' for China's economic development, a key link in expanding its domestic demand, and a direct manifestation of people's pursuit of a better life. In the information era, the DE, as a new economic form, has developed in coordination with the financial industry to become an important driver of Chinese residents' consumption upgrading. Based on the panel data of 30 provinces in China from 2006 to 2021, this study divided consumption upgrading into CL and CS and examined the impact and mechanism of the DE and FD on residents' consumption upgrading. The conclusions are as follows:

First, both the DE and FD have a significantly positive impact on residents' consumption upgrading. Both can promote the increase in consumption expenditure and transform the CS from subsistence to development and enjoyment. Second, the positive impact of the DE and FD on residents' consumption upgrading has a synergistic effect. The two promote and integrate with each other to positively empower major forms of residents' consumption upgrading, such as digital financial services. Third, both the DE and FD can significantly promote industrial structure optimization; RIS and UIS are common mechanisms that can promote residents' consumption upgrading. Fourth, the DE significantly promotes residents' consumption upgrading in the central and western regions, whereas the promotion effect of FD is more significant in the eastern region. This synergistic effect could significantly increase the consumption expenditure in the central region and improve the CS in the eastern region. Fifth, the DE, FD, and their synergistic effect could more effectively promote rural residents' consumption upgrading compared to that of urban residents. Finally, with the advancement of the NURB, the DE and FD have a nonlinear impact on the expansion of residents' consumption expenditure, and their synergistic effect has nonlinear characteristics on the improvement of residents' CS.

Based on these findings, this study proposes the following countermeasures. First, the construction of digital infrastructure and the development of digital industries should be promoted, and digital talent reserves should be enhanced. It is necessary to increase investment in digital infrastructure; actively deploy 5G, big data centers, the Internet industry, and the Internet of Things; and accelerate the construction of a sound digital infrastructure network system. It is necessary to consolidate the development dividends of the digital industry, increase support for the development of the digital industry, create a more suitable growth environment for the digital industry, continuously improve the regional digital industry division of labor and support systems, and improve the adaptability of industrial supply and residents' needs. Simultaneously, it is necessary to actively attract and increase the accumulation of digital talent, strengthen the quality of education and training of digital human capital, increase the construction of vocational education platforms, provide living security for digital talent engaged in digital industry-related work, and cultivate more digital talent that can meet market needs.

Second, it is necessary to expand the financial scale and improve financial efficiency. The expansion of the financial scale requires both quantitative development and qualitative

improvement. By adding financial institutions and improving financial services, remote areas are encouraged to develop and optimize multilevel capital markets. It is necessary to deepen financial system reform, improve financial support policies, and establish flexible financial and credit systems. The financial system's service efficiency should be steadily improved, the vitality of the financial market should be enhanced, and the costs of financial intermediaries should be reduced. Guided by market demand, it is necessary to use big data and other technologies to improve the quality of financial service supply and promote the rational allocation of capital resources. The development of financial derivative products, such as consumer credit, must be promoted to better meet people's financial and consumption needs.

Third, China should actively guide the digital transformation of traditional financial institutions to promote the development of digital financial services. It is necessary to clarify and strengthen support policies for the deep integration of digital technology and finance, give full play to the role of digital technology in promoting reform and innovation in the financial field, encourage traditional financial institutions to use digital technology, and promote the innovation and transformation of traditional financial institutions. It is important to promote the development of digital financial services and accelerate the construction of infrastructure, technology, and trading platform systems, as well as the technological innovation process, to further unlock the development momentum of digital financial services through a good policy environment. It would be effective to highlight the low-cost advantages of digital financial services, reduce the degree of information asymmetry, and increase their development dividends. The education and publicity of digital financial services should be strengthened by focusing on expanding their breadth and depth and by actively developing their long tail and inclusive effects.

Finally, it is important to continue to promote the optimization of the industrial structure and give full play to the mechanisms of RIS and UIS in the process of residents' consumption upgrading. It is necessary to promote industrial digitalization, accelerate the penetration and integration of the DE and traditional industries, and conduct an all-round and full-chain transformation of traditional industries that rely on digital technology. Simultaneously, it is necessary to promote digital industrialization, improve the market supply capacity of the information industry, and expand the depth and breadth of the DE. It is important to guide the flow of financial supply, give full play to the supporting and auxiliary role of FD to optimize the industrial structure, promote the rational allocation of economic resources, improve industrial economic efficiency, strengthen information disclosure, provide financial support for industrial development, and improve industrial financing efficiency. Through industrial structure optimization, the vitality of the industry could be enhanced from the supply side to provide a supply guarantee for residents' consumption upgrading.

7. Limitations and Future Prospects

This study included the DE, FD, and residents' consumption upgrading in the research framework, examined the impact and mechanism of the DE and FD on residents' consumption upgrading from the synergistic effect and industrial structure optimization perspectives, and proposed policy recommendations for promoting residents' consumption upgrading. However, this study had several limitations.

First, many factors can affect the DE. This study measured the development level of the DE from the perspectives of digital infrastructure, digital industry development, and digital talent, which may not provide a comprehensive measure of the DE.

Second, the sample used herein was based on provincial-level data, which may have biased the results to a certain extent due to the small sample size. Therefore, using prefectural- or county-level data could provide more detailed and accurate results.

Third, there may be other common mechanisms of the DE and FD that promote residents' consumption upgrading that this study was unable to discover.

Finally, this study only examined the impact of the DE and FD on residents' consumption upgrading from a macro perspective. Therefore, relevant research on micro-level and spatial spillover effects must be conducted in the future.

Future studies could use more refined measures of the development of the DE and more detailed data and methods to explore the impact and mechanism of the DE and FD on residents' consumption upgrading from the microcosmic or spatial spillover effect perspectives.

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