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Digital Finance, Consumption Enhancement, and E-commerce's High-quality Progress: An Impact Analysis Based on Computer Technology

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Abstract

Digital finance emerges from the fusion of financial expertise with the advancements in computer science and technology. Computer technology provides strong data processing and analysis capabilities for digital finance, and provides strong support and guarantee for the e-commerce's high-quality progress. In order to investigate the correlation between digital finance, consumption enhancement and e-commerce's high-quality progress, and to explore the influencing factors and policy paths of the high-quality advancement of e-commerce in the contemporary era. This study examines the impact of digital money from a theoretical perspective, the channel effect of consumption enhancement and the regulation effect of consumer psychology in the process of enhancing e-commerce quality, and builds an econometric model for quantitative empirical research. Using panel data to digital finance as the breakthrough point, this study discusses the important drivers of electronic commerce high quality development, refinement study the computer technology for electronic commerce infrastructure support, analysis of "digital finance, consumption upgrade, and e-commerce's high-quality progress" channel influence and transmission mechanism. This paper also explores the regulating effect of consumer psychology on the correlation between digital finance, consumption enhancement and e-commerce's high-quality progress. The research results show that the e-commerce's high-quality progress can be promoted by expanding the exploration of digital finance and enhancing digital finance depth, while digital financial services, bolstered by computer technology, are increasingly instrumental in advancing regions with robust development profiles, and consumption enhancement can play a channel role and transmission effect. Consumer psychology plays a negative role in regulating the e-commerce's high-quality progress. With the improvement of residents' marginal propensity to consume, the positive impact of digital finance on advancing high-quality e-commerce progress is compromised. Therefore, the e-commerce's high-quality progress under the new situation should be actively promoted to promote the upgrading of household consumption. By focusing on the psychological needs of consumers, e-commerce can achieve high-quality development.

Keywords: Digital finance, consumption enhancement, e-commerce, computer technology.

1. Introduction

Computer technology has always been fundamental in the evolution of e-commerce. It is not only a powerful tool for data storage and processing, but also the key to realize transaction automation, real-time information update and customer service optimization. Through the application of computer technology, e-commerce can cross the geographical boundaries, provide all-weather and efficient business services, and promote the digital evolution of the global economy. As an emerging service industry with rapid development, e-commerce drives shifts in circulation methods, facilitates the evolution of consumption and industrial structures, and injects fresh impetus into the advancement of regional economies towards high-quality growth [1]. Consumption enhancement is a key path to expand domestic demand and a fundamental measure to maintain steady domestic economic growth. Consumption enhancement will further drive the development of the consumer market, promote the balance of supply and demand at a higher level, and finally achieve sustainable economic growth. Thus, it is essential to persist in unlocking the potential for consumer spending and to advance the upgrading of consumption as these are crucial steps in broadening internal demand and fostering high-caliber economic growth. Digital finance has made remarkable achievements in promoting consumption innovation and building convenient channels for consumption, and has become an important engine for improving the quality and expansion and innovative development of the consumer market. In recent times, the growth of digital finance has significantly influenced consumption. Digital payment facilitates consumption, digital credit helps consumption, and digital insurance increases consumption by reducing defensive savings. For example, with "Alipay" as the typical representative of digital financial institutions with "single amount small micro, transaction number sea quantitative, marginal cost low" the advantage of simplifying the cost and mode of financial services [2], vigorously improve the traditional financial industry represented by the bank of the high cost, high threshold, information [3-5] asymmetry. Digital finance includes the financial vulnerable groups excluded from traditional finance into the financial service field, provides low threshold and low cost credit support [6], and provides convenient conditions for residents to change from lower-tier consumption to middle and high-end consumption. Based on this, this paper deeply studies the correlation of digital finance, consumption enhancement and e-commerce, and analyzes the impact of computer technology, big data and artificial intelligence on e-commerce model innovation, e-commerce user portrait analysis, personalized service recommendation, e-commerce credit optimization, intelligent supply chain management and other aspects [7,8]. It is valuable to investigate e-commerce's high-quality growth path in the modern age.

2. Research Literature Review

Throughout those existing literature, numerous domestic and international academia have conducted extensive research on topics such as "digital finance" and "e-commerce," along with other relevant areas. Surprisingly, there is a scarcity of scholarly attention dedicated to examining the impact of digital finance on the progression of e-commerce. The research literature closely related to this issue mainly includes two categories. The initial category of literature delves into the impact and workings of digital finance on consumer behavior, primarily scrutinizing the effect of digital finance characteristics on individuals and their consumption patterns. Digital inclusive finance can enhance residents' consumption level and quality through five dimensions: income effect, savings effect, payment effect, security effect and poverty reduction effect, and at the same time form the catch-up effect [9], and can significantly improve rural consumption [10]. The second type of literature focuses on the drivers of e-commerce development. According to the research, the key elements influencing e-commerce growth include: policy and environment [11], infrastructure [12], interpersonal trust [13], risk cognition [14], market technology [15], subjective understanding [16], information degree [17], transaction level [18], etc. In conclusion, the current research aimed at advancing digital finance and e-commerce has established a foundation of both theoretical framework and practical implementation., but for the role of the channel and influence effect research is still in its infancy, only some scholars examined the digital financial influence on e-commerce path, put forward the digital financial support from infrastructure, financing costs, risk monitoring, innovation mode [19]. However, certain documents delve into exploring the correlation between digital finance and e-commerce. For instance, some academics have scrutinized the interplay between digital inclusive finance and the holistic progress of e-commerce [20]. Therefore, to make up for the above defects, the marginal contribution of the article mainly includes the following aspects: Firstly, this paper explores the influence of digital finance on e-commerce, offering fresh insights that go beyond a singular viewpoint and delve deeper into the key factors driving the impressive advancement of online businesses. Secondly, based on the perspective of consumption enhancement, it explores the possible transmission paths of digital finance, consumption enhancement and e-commerce's high-quality progress, in order to explore a new path for digital finance to affect the e-commerce's high-quality progress. Thirdly, based on the test of digital finance and consumption enhancement and the e-commerce's high-quality progress, this paper takes consumer psychology as a moderating variable and includes it in the regression analysis, providing supporting evidence for the government to reasonably improve the decreasing trend of the marginal tendency of consumer consumption in the e-commerce's significant advancement.

3. Theoretical Model Construction

3.1 Theoretical analysis hypothesis

This study examines how digital finance affects the substantial advancement of e-commerce, the channel influence introduced by consumption enhancement and the regulating effect of consumer psychology, and puts forward research hypotheses accordingly.

(1) The operational mechanism of digital finance

Digital finance originates from the financial business department of the e-commerce platform, and has a close connection in terms of capital and business, providing effective credit support for the e-commerce operators. There exists a favorable connection between digital finance and the advancement of e-commerce [21]. The new financial model represented by digital inclusive finance will provide effective financial services for all participants in the supply chain of e-commerce products, improve the supply elasticity of the e-commerce industry chain, and the quality of e-commerce products and services [22]. In addition, the sinking and penetration of digital technology has given new drive for regional economic growth. As the key application of digital technology, its development has overcome the boundary of time and space and changed the mode of economic growth and the business environment of e-commerce enterprises. Accordingly, the hypothesis H1 is proposed.

Hypothesis H1: Digital finance significantly benefits the e-commerce's high-quality progress.

(2) The channel effect of consumption enhancement

With the process of the economy and society, the consumer demand is gradually diversified, the consumption content and mode are constantly enriched, and the consumption enhancement has been endowed with new connotations. Boosting consumption levels, refining the structure of consumption, and elevating the quality of consumption all contribute to propelling the enhancement of consumer behavior. Relying on the integration of finance and Internet, digital finance deeply promotes consumption enhancement, mainly manifested: Firstly, digital finance is conducive to solving the financial discrimination of traditional credit institutions, giving more financial support to the ordinary people, and bringing more vigorous consumer demand on the demand side; Secondly, digital finance uses its inclusive and digital characteristics, effectively alleviates regional and time constraints, and promotes consumption enhancement; Thirdly, digital finance plays a crucial role in enhancing and optimizing income structure, which, fosters the enhancement of consumption standards and quality. In addition, leveraging the potential of digital finance to enhance residents' shopping habits can revolutionize the way e-commerce operates, elevating both the scope and impact of online retail growth. Digital finance and consumption enhancement will help stimulate residents' willingness to consume online, effectively enhance the supply capacity of e-commerce, improve the supply structure of e-commerce products and services, and promote the e-commerce's high-quality progress. Accordingly, the hypothesis H2 is proposed.

Hypothesis H2: Digital finance can drive the e-commerce's high-quality progress by promoting consumption enhancement.

(3) The adjustment effect of consumer psychology

Recently, the increasing real purchasing power of residents has furnished a theoretical foundation for supporting consumer psychology, and also provided an endogenous power for the sustained and e-commerce's high-quality progress. A large number of scholars believe that the synchronous increase of digital finance and marginal propensity of consumption reflects the current psychological propensity of consumption, and the regulating effect of marginal propensity of consumption on digital finance is a significant economic force to promote the e-commerce's high-quality progress. Through research, it is found that consumer psychology affects the growth of online commerce and fresh retail, digital finance is conducive to improving the consumption tendency of residents, the era of Internet information has paved the way for the widespread adoption of cutting-edge technologies.

Moreover, the way consumers think and act when buying has profoundly influenced how digital finance contributes to the elevated progression of e-commerce. [23]. Accordingly, the hypothesis H3 is proposed.

Hypothesis H3: Consumer psychology plays a regulatory role between digital finance and the e-commerce's high-quality progress.

3.2 Selection of model variables

(1) The explained variables

The explained variable is the e-commerce's high-quality progress (*EleC*). the e-commerce's high-quality progress involves multiple dimensions such as transaction scale, infrastructure and human resources. It is difficult to judge the high-quality development level of e-commerce scientifically, comprehensively and accurately by using a single index. Based on this, in view of the previous research [24,25] and related improvements, the evaluation index system of high-quality development of e-commerce is constructed from three dimensions: transaction scale index, infrastructure index and human capital index, as shown in Table 1, and the index empowerment and comprehensive value are calculated by entropy method.

Table 1 Evaluation index system for the e-commerce's high-quality progress.

Dimension factors	Characterization index	Indicator direction
Trading scale index	E-commerce procurement ratio	(+)
	E-commerce sales ratio	(+)
	The proportion of e-commerce transactions	(+)
	Proportion of express delivery business revenue	(+)
	Number of express delivery service per capita	(+)
Infrastructure Index	Number of computers per 100 individuals	(+)
	Number of Internet broadband access users	(+)
	Number of mobile Internet users	(+)
	Mobile phone adoption rate	(+)
	Domain name number	(+)
	Website number	(+)
Human capital index	Proportion of e-commerce practitioners	(+)
	E-commerce personnel salary proportion	(+)
	The proportion of express delivery and logistics employees	(+)
	Express delivery logistics personnel salary proportion	(+)

(2) Explanatory variable

The explanatory variable is digital finance (*DigF*). At present, the research of digital elements under the development trend of emerging economies has gotten significant interest in academic circles, this paper selects digital financial (*DigF*) as the core explanatory variable. The digital financial inclusion index at Peking University functions as the key variable in this analysis, assessing the degree of progress in digital banking services [26-28], and the logarithm is taken for the volatility of the smoothed data.

(3) Intermediary variable

The intermediary variable is consumption enhancement (*ConU*). It includes three aspects as shown in Table 2. Among them, the consumption level is expressed by the consumer price index and the overall retail sales of social consumer goods. After logarithmic processing, the consumption level is not changing the relative size of the original data. The consumption structure is comprehensively measured according to the proportion of cultural consumption and service consumption. In this paper, cultural consumption is gauged by examining spending on education, culture, and entertainment, while service consumption is determined by totaling expenses on transportation, communication, medical care, and other goods and services [29]. For the measurement of consumption quality, the Engel coefficient is adopted. A lower Engel coefficient indicates higher other consumption and stronger consumption quality. The entropy method is utilized to weigh the indicator and compute the holistic value.

Table 2 Evaluation index system of consumption enhancement and capacity expansion.

Dimension factors	Characterization index	Indicator direction
level of consumption	consumer price index	(-)
	total retail sales of essential consumer goods.	(+)
consumption structure	proportion of cultural consumption	(+)
	proportion of service consumption	(+)
consumption quality	Engel coefficient	(-)

(4) Adjustment variables

The adjustment variable is consumer psychology (*ConP*). Consumer psychology is the psychological characteristics and activity process of consumers in consumption activities, including observation of goods, information collection, brand selection, purchasing decision, use feeling and other aspects. The psychological factor of consumers is the core element of consumption enhancement and expansion, but also the endogenous source of promoting the e-commerce's high-quality progress. The marginal propensity to consume method is adopted to define consumer psychology [30], which represents the changes of residents' consumption when each unit of disposable income is increased or decreased. It directly indicates residents' consumption preference and purchase tendency of commodities from the basic level.

(5) Control variables

Control variables include economic development level (*EcoD*), degree of opening to the outside world (*Open*), urbanization development level (*City*), and resident income structure (*IncS*). The level of economic development (*EcoD*) is measured by the proportion of the added value of the tertiary industry in regional GDP; the degree of openness (*EcoD*) adopts the logarithm of the proportion of regional GDP; the level of urbanization (*City*) is expressed by the proportion of urban population [31]; the income structure (*IncS*) is expressed by the proportion of non-wage income in per capita disposable income.

3.3 Construction of econometric model

When selecting an econometric model method, the fixed effect model is employed to examine how digital finance influences the advancement of high-quality e-commerce. To further investigate the causal pathway of digital finance affecting enhanced consumption, which subsequently impacts the progression of high-quality e-commerce, consumption enhancement is designated as the dependent variable, with digital finance as the independent variable to assess the influence of digital finance on consumption enhancement. In view of the regulating effect of consumer psychology on digital finance, consumption enhancement and high-quality development of e-commerce, the interactive items of digital finance and consumer psychology is added in the model, so as to observe the influence relationship between digital finance, consumer psychology, consumption enhancement and the e-commerce's high-quality progress. In conclusion, the regression model is constructed as shown in Equation (1) to Equation (4).

$$EleC_{it} = \alpha_{11} + \alpha_{12} DigF_{it} + \sum_{k=1}^{4} \beta_k Controls_{kit} + \mu_i + \gamma_t + \varepsilon_{ij} \tag{1}$$

$$ConU_{it} = \alpha_{21} + \alpha_{22} DigF_{it} + \sum_{k=1}^{4} \beta_k Controls_{kit} + \mu_i + \gamma_t + \varepsilon_{ij} \tag{2}$$

$$\begin{aligned} EleC_{it} = {} & \alpha_{31} + \alpha_{32} DigF_{it} + \alpha_{33} DigF_{it} \times ConP_{it} + \alpha_{34} ConP_{it} \\ & + \sum_{k=1}^{4} \beta_k Controls_{kit} + \mu_i + \gamma_t + \varepsilon_{ij} \end{aligned} \tag{3}$$

$$\begin{aligned} ConU_{it} = {} & \alpha_{41} + \alpha_{42} DigF_{it} + \alpha_{43} DigF_{it} \times ConP_{it} + \alpha_{34} ConP_{it} \\ & + \sum_{k=1}^{4} \beta_k Controls_{kit} + \mu_i + \gamma_t + \varepsilon_{ij} \end{aligned} \tag{4}$$

In Equations, i and t represent the province and year respectively, $EleC_{it}$ represents the e-commerce's high-quality progress, $DigF_{it}$ represents the digital financial inclusion index, $ConP_{it}$ represents consumer psychology,

$ConU_{it}$ represents consumption enhancement, $Controls$ is the control variable, μ_i is the individual fixed effect, γ_t is the time fixed effect, and ε_{ij} is the random disturbance term.

3.4 Panel data source

This study focuses on investigating digital finance and e-commerce development across 31 provinces, cities, and autonomous regions in China. The research utilizes panel data from 2015 to 2022, drawing primarily from sources such as the "China Statistical Yearbook," "China Urban Statistical Yearbook," "China E-commerce Report," "Peking University Digital Financial Inclusion Index," and official statistical reports from regional websites. In cases where specific indicator data was unavailable, linear interpolation was applied to address the gaps while considering the inherent nature of the indicators.

The data provides a comprehensive analysis by utilizing means or medians, as displayed in Table 3. Upon examination, it is clear that the average values for the overall digital finance index and its respective components of coverage breadth, use depth, and digitization degree are closely aligned. Notably, two variables, consumption enhancement and income structure, have outlier values exceeding the mean by three standard deviations, indicating considerable variability.

Table 3 Descriptive statistics findings for the variables.

Variable	Variable code	sample capacity	least value	crest value	average value	standard deviation	median
Electronic Commerce	*EleC*	248	0.050	0.499	0.145	0.106	0.111
Digital finance	*DigF*	248	0.503	0.598	0.553	0.021	0.556
Cover breadth	$DigF_1$	248	0.468	0.589	0.545	0.026	0.551
Use depth	$DigF_2$	248	0.454	0.617	0.548	0.031	0.552
Digitization degree	$DigF_3$	248	0.552	0.596	0.576	0.010	0.579
consumption enhancement	*ConU*	248	0.247	0.712	0.538	0.075	0.537
Consumer psychology	*ConP*	248	0.322	0.882	0.635	0.119	0.648
Economic development level	*EcoD*	248	0.399	0.838	0.523	0.079	0.509
Open to the outside world	*Open*	248	0.008	1.038	0.239	0.235	0.135
urbanization level	*City*	248	0.010	3.218	2.896	0.476	3.027
Resident income structure	*IncS*	248	0.286	0.542	0.449	0.050	0.455

4. Analysis of the Empirical Findings

4.1 Primary regression analysis

According to the benchmark model (1), Table 4 reports the regression results of the high-quality development of digital finance and e-commerce. Column (1) shows that the regression coefficient of digital finance (*DigF*) is 5.383 (P <0.01) without control variables and fixed effects. On this basis, after fixed addition of column (2) of all control variables and regions and years, the regression coefficient estimate of digital finance (*DigF*) is still significantly positive at the 1% level, indicating that digital finance can significantly promote the e-commerce's high-quality progress. Hypothesis H1 is verified. On the basis of studying the general index of digital inclusive finance to promote the e-commerce's high-quality progress, the differentiated impact of different dimensions of digital finance on the development of e-commerce is further refined. Columns (3) to (5) show the regression results of the three sub-dimensions of coverage breadth ($DigF_1$), depth of use ($DigF_2$) and digitization degree ($DigF_3$) of digital finance on the e-commerce's high-quality progress. After analysis, it is found that the regression coefficients of coverage breadth ($DigF_1$) and depth of use ($DigF_2$) of digital finance are 1.992 (P<0.01) and 0.809 (P<0.05), respectively. This shows that it has a strong role in promoting the e-commerce's high-quality progress, and can significantly promote the e-commerce's high-quality progress by covering more audiences and continuously deepening and innovating digital financial products and services. However, the regression system of digitalization degree (*DigF*$_3$) is not significant, indicating that there is no linear relationship between digitalization degree and high-quality development of e-commerce. In terms of the regression results of control variables, the regression coefficient estimates of economic development level (*EcoD*) and openness degree (*Open*) are significantly positive at 1%, which can greatly enhance e-commerce growth; the regression coefficient estimates of urbanization level (*City*) are significantly negative at 1%; and the control variable of resident income structure (*IncS*) has no significant impact on the high quality development of e-commerce.

Table 4 The benchmark regression outcomes for the fixed-effect models.

variable	E-Commerce	E-Commerce	E-Commerce	E-Commerce	E-Commerce
	(1)	(2)	(3)	(4)	(5)
Digital finance	5.383** (2.991)	2.321*** (4.013)			
Cover breadth			1.922*** (4.514)		
Use depth				0.809** (2.728)	
Digitization degree					-0.321 (-0.543)
Economic development level		0.527*** (11.194)	0.529*** (11.344)	0.522*** (10.865)	0.502*** (10.411)
Open to the outside world		0.180*** (6.277)	0.195*** (8.070)	0.216*** (8.060)	0.272*** (13.821)
urbanization level		-0.137*** (-24.130)	-0.133*** (-24.195)	-0.136*** (-23.197)	-0.131*** (-22.716)
Resident income structure		0.065 (0.993)	0.129* (2.006)	0.053 (0.778)	0.111 (1.606)
Area fixed	×	√	√	√	√
Time fixed	×	√	√	√	√
constant term	-2.943** (-2.853)	-1.090*** (-3.488)	-0.899*** (-3.802)	-0.252 (-1.636)	0.333 (1.007)
sample capacity	248	248	248	248	248
R^2	0.234	0.664	0.658	0.805	0.853

Note: ***, **, * pass the test at 1%, 5% and 10% significance levels respectively.

4.2 Robustness test

To guarantee the precision of the study findings, the robustness test employs the following techniques: Initially, the endogeneity issue is taken into account. A potential causal link between digital finance and the advancement of high-quality e-commerce could introduce bias into the research outcomes. To ensure the research results' scientific accuracy, the lag phase of digital finance is retroactively regressed as an instrumental variable. As shown in Columns (1) of Table 5, the estimated regression coefficient for the lag phase of digital finance remains significantly positive, suggesting that the regression findings mentioned earlier are somewhat robust. Secondly, the other stability tests. 1) Replace the explained variable. According to the evaluation index system of e-commerce's high-quality progress mentioned above, the transaction scale index, infrastructure index and human capital index together constitute the definition of high-quality development of e-commerce. These three subdivided indicators are selected as the explained variables to verify the robustness of the model again. 2) Change of the regression model. Based on the previous results, the regression analysis was repeated using a systematic GMM model. 3) Some samples are excluded for robustness estimation. Referring to the relevant research results [32], Beijing, Shanghai, Tianjin and Chongqing municipalities are excluded from the sample for regression analysis again. The findings of other robustness tests are reported in Table 5 from the Columns (2) to (6). The findings of the study demonstrate that the regression coefficients associated with the digital finance variable are highly significant at the 1% confidence level.

Table 5 Regression results for the robustness test.

variable	Consider the endogeneity problem	Trading scale index	Infrastructure Index	Human capital index	Change model method	Change the sample size
	(1)	(2)	(3)	(4)	(5)	(6)
Digital finance	2.798*** (4.608)	0.497*** (5.737)	1.312*** (9.061)	0.751*** (4.747)	1.338*** (4.330)	0.191*** (4.342)
controlled variable	√	√	√	√	√	√
Area fixed	√	√	√	√	√	√
Time fixed	√	√	√	√	√	√
constant term	-1.347*** (-4.136)	-2.123*** (-19.954)	-0.758*** (-4.263)	0.056 (0.290)	-0.595*** (-3.523)	0.246*** (5.063)
sample capacity	217	248	248	248	248	216
R^2	0.610	0.732	0.469	0.180	0.075	0.477

4.3 Spatial heterogeneity analysis

Considering that regions with better development of digital finance have strong advantages in human capital, more financing channels, complete infrastructure and high level of innovation, it is easier to achieve the e-commerce's high-quality progress. Table 6 reports the results of spatial heterogeneity regression analysis. The regression results in Column (1) of Table 6 show that the coefficient of digital finance is 8.800 ($P<0.01$), that is, digital finance in regions with high levels of digital finance has a positive and significant effect on the e-commerce's high-quality progress. The regression results in Column (2) of Table 6 show that digital finance in areas with low levels of digital finance has no significant effect on the e-commerce's high-quality progress. The regression analysis in columns (3) to (5) of Table 6 shows that the coefficients of digital finance in the eastern, central and western regions are 8.324 ($P<0.01$), 1.421 ($P<0.01$) and 1.519 ($P<0.1$), respectively, which can significantly and positively promote the e-commerce's high-quality progress, but the significance decreases in turn. To sum up, in the process of comprehensively promoting the e-commerce's high-quality progress, the spatial heterogeneity of the enabling effect of digital finance should be taken into account, and differentiated development measures should be implemented according to local conditions to narrow the gap in the e-commerce's high-quality progress

Table 6 Results of the regression of spatial heterogeneity.

variable	high tone	low level	east	central section	west
	(1)	(2)	(3)	(4)	(5)
Digital finance	8.800*** (9.099)	0.987 (1.027)	8.324*** (7.897)	1.421*** (4.579)	1.519* (2.235)
controlled variable	√	√	√	√	√
Area fixed	√	√	√	√	√
Time fixed	√	√	√	√	√
constant term	-4.733*** (-8.024)	-0.285 (-0.549)	-5.403*** (-8.183)	-0.875*** (-4.677)	-0.537 (-1.493)
sample capacity	176	72	88	64	96
R^2	0.251	0.957	-1.086	-1.294	0.870

4.4 Mechanism of action analysis

(1) Test of intermediary conduction effect

According to the above theoretical analysis, the possible transmission mechanism and influence channel of "digital finance, consumption upgrade, and e-commerce's high-quality progress" are tested. Referring to the research of

JIANG, the traditional three-step method of mediating variable test has serious endogeneity problems in the research field of the article [33]. Firstly, it tests whether the explanatory variable acts on the intermediary variable, and uses Model (2) to replace the explained variable with consumption enhancement for regression analysis. On this basis, the impact of the intermediary variable on the explained variables is further tested, so as to supplement the support of correlation evidence.

Table 7 reports the regression results of the transmission effect. The regression results in Column (1) of Table 7 show that the coefficient of digital finance is 1.714 ($P<0.01$), which proves the positive impact of digital finance on consumption enhancement. Furthermore, the regression results of Column (2) of Table 7 show that the coefficient of consumption enhancement is 0.410 ($P<0.01$), indicating that consumption enhancement helps to promote the e-commerce's high-quality progress. To sum up, digital finance stimulates consumers to expand consumption demand, improve consumption level, optimize consumption structure and improve consumption quality by providing diversified and personalized financial services for consumers from all walks of life, thus promoting consumption enhancement to promote high-quality development of e-commerce. Accordingly, assuming that H2 verification, it shows that consumption enhancement is the potential influence channel for digital finance to promote the e-commerce's high-quality progress.

Table 7 Test of the intermediary effect of consumption enhancement.

variable	consumption enhancement	Electronic Commerce
	(1)	(2)
Digital finance	1.714*** (3.517)	
consumption enhancement		0.410*** (4.625)
controlled variable	√	√
Area fixed	√	√
Time fixed	√	√
constant term	-0.327 (-1.154)	0.558*** (6.626)
sample capacity	248	248
R2	0.023	0.365

In order to ensure the accuracy of the research results, the study utilizes the lagged digital inclusive financial index as an instrumental variable to explore the impact of digital finance on enhancing consumption. Additionally, the GMM model is modified for a fresh round of regression analysis. To refine the study, the analysis excludes four municipalities—Beijing, Shanghai, Tianjin, and Chongqing—from the sample. The outcomes of the final regression analysis all demonstrate statistical significance at the 1% level, as depicted in Table 8.

Table 8 Regression results for robustness test.

variable	Consider the endogeneity problem	Change model method	Change the sample size
	(1)	(2)	(3)
Digital finance	0.837*** (3.637)	0.958*** (4.886)	0.680** (3.202)
controlled variable	√	√	√
Area fixed	√	√	√
Time fixed	√	√	√
constant term	0.349 (1.114)	0.008 (0.076)	0.368 (1.286)
sample capacity	217	248	216
R^2	0.044	0.064	0.052

(2) Test of regulatory effect

This paper investigates how digital finance contributes to the enhanced the e-commerce's high-quality progress, with a focus on the moderating role of consumer psychology in this evolution towards higher quality e-commerce. According to the above theoretical analysis, consumer psychology plays a regulating role among the e-commerce's high-quality progress, digital economy and consumption enhancement. Accordingly, regression Model (3) and regression Model (4) are used to verify the conclusion, and Table 9 reports the verification results of moderating effect. The impact of consumer psychology on the advancement of high-quality e-commerce within the digital economy is demonstrated in Column (1) of Table 9. Furthermore, the coefficient for the interaction term "digital finance × consumer psychology" is -10.776 (P<0.01), signifying the establishment of a mediating effect within the model. This shows that consumer psychology can influence the connection between digital finance and the e-commerce's high-quality progress in a negative way. Specifically, the increase in residents' willingness to spend can undermine the positive effects of digital finance on the progress of e-commerce. Nevertheless, an analysis of Column (2) in Table 9 reveals that the combined impact of "digital finance×consumer psychology" does not significantly enhance consumption, indicating that a moderating mediating influence has not been confirmed.

Table 9 Test of moderating mediating effect of consumer psychology.

variable	Consumer psychology	
	Electronic Commerce	consumption enhancement
	(1)	(2)
Digital finance	1.230*** (4.892)	0.587* (2.526)
Digital financial consumer psychology	-10.776*** (-5.604)	-0.710 (-0.400)
Consumer psychology	-0.053 (-1.098)	-0.145** (-3.248)
controlled variable	√	√
Area fixed	√	√
Time fixed	√	√
constant term	0.755*** (12.568)	0.571*** (10.289)
sample capacity	248	248
R^2	0.480	0.120

5. Conclusions and Suggestion

In this digital age, e-commerce stands as the forefront of scientific and technological innovation in the digital economy - it's the largest, fastest-growing, and most dynamic sector. The advancement of e-commerce has significantly slashed the expenses involved in acquiring, organizing, and dispersing information. This research explores the world of digital finance to assess the extent of substantial progress in Chinese online business from 2015 to 2022. It delves into the interplay between digital finance and the progress of e-commerce, exploring how the enhancement of consumer spending, coupled with consumer psychology, influences this progression. Furthermore, it dissects the intricate network of mechanisms through which digital finance propels the e-commerce's high-quality progress. This paper specifically states the following conclusions: Firstly, enhancing the scope and depth of digital finance can drive the advancement of e-commerce's quality greatly. Secondly, a study on the disparity in digital finance development across different regions reveals that regions with higher levels of development benefit more from digital finance in enhancing e-commerce, with the eastern region outperforming the central and western regions significantly. Thirdly, the provision of diverse financial services through digital finance can elevate household consumption patterns and facilitate the progress of e-commerce by serving as a conduit for growth. Lastly, consumer behavior serves as a significant factor that impacts the correlation between digital finance and the advancement of e-commerce quality. As residents' inclination towards consumption increases, the beneficial impact of digital finance on e-commerce quality decreases.

Given the insights provided, harnessing the full potential of digital finance is crucial in driving the substantial progress of e-commerce, the following strategies and recommendations are proposed: Firstly, it is essential to promote the coordinated development of digital finance and e-commerce. Improving digital finance can significantly support the high-quality advancement of e-commerce. As a result, the government should proactively endorse concentrating on enhancing the fundamental ecosystem for digital finance growth, promoting the evolution and enhancement of e-commerce practices, establishing a robust basis for maximizing the empowering influence of digital finance, and building a strong digital infrastructure to support the high-class evolution of e-commerce. Secondly, differentiated regional development measures need to be implemented. There are evident regional differences in the impact of digital finance on e-commerce excellence. Based on the actual development of each region, the government should actively implement the differentiated regional development strategy, break the spatial restriction of regional development with the help of the high permeability of digital finance. Thirdly, the government need to pay attention to changes in consumer psychology, tap people's marginal propensity to consume, and continue to upgrade and deepen consumption. It should continue to drive the growth of digital finance, proactively seek out a successful approach for digital finance to boost consumer spending, and achieve a self-sustaining cycle of e-commerce expansion and a prosperous economy. Fourthly, each region should continue to deepen the opening up, break down administrative barriers in various regions, optimize the free flow and free trade of factors, and effectively boost the ability of digital finance to drive the e-commerce's high-quality progress. Fifthly, facing the ever-changing development of computer technology, it should deeply integrate cutting-edge technologies to improve the security and efficiency of e-commerce platforms, optimize user experience, and realize precision marketing and personalized services, so as to enhance e-commerce towards greater quality, intelligence, and sustainability.

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