Digital Retailing as a Promoter of Employment: Evidence from China

Xu, Tao

Nanjing University of Finance and Economics

1 November 2020

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TAO XU[1]

School of International Economics and Trade

Nanjing University of Finance and Economics

Abstract

This paper applies the Digital Retailing Development Index, matching employment statistics from 2010 to 2019, to empirically analyze the relationship between the development of digital retailing and employment. Considering endogenous factors, the paper proves that the development of digital retailing plays a significant positive role in promoting popular employment and that production, logistics, service, transaction and environment of digital retailing are positively correlated with employment. Based on mechanism analysis, the paper finds that the optimization of logistics, service and transaction is closely related to the improvement of employment, which reflects the ecosystem and experience of digital retailing.

Keywords: Digital Retailing; Employment; New Retailing

1 TAO XU, School of International Economics & Trade, Nanjing University of Finance & Economics, Nanjing, 210046, China.

Contents

1. Introduction

Digitalization, since 2016, has been an important direction for development of the retail sector. Amid the development of China's economy, the retail sector, as the outcome of socialized mass production, links production and consumption while facilitating the circulation of merchandise between enterprise production and individual consumption, thus ensuring the continuous operation of social reproduction. Currently, in the era of "Internet Plus", the development speed of the traditional retail sector is slowing down in the face of the huge changes brought by the digital economy, while the digital retailing format will realize the integration and upgrading of online and offline in the future, reshaping the industry with "new retailing". E-commerce giants such as Ali and JD are also arranging new formats to adapt to changing consumer demand. Through the combination of the Internet of Things, artificial intelligence and big data with business, digital retailing continues to evolve and "new retailing" business models are changing, with retail trade models ushering in changes that can form an economic effect of advancing employment.[1]

The Covid-19 pandemic has, however, placed tremendous pressure on the global economy. China's economy, too, has become more volatile, in the process facing severe challenges due to the overlapping effects of the global economic downturn and the Sino-U.S. trade war. In terms of industry, the pandemic has had a major impact on the tertiary industry such as catering, tourism, passenger transportation, film and television. In this context, the sudden public health events make it difficult for the normal operation of the economy and society, thus "stabilizing employment and ensuring people's livelihood" is facing a crisis. A number of provinces and cities across China have issued notices to temporarily cancel job fairs at schools or postpone spring school recruitment due to the sudden public health incidents that make it difficult for the economy and society to function normally. According to relevant data, there will be 8.74 million fresh graduates from Chinese universities in 2020, an increase of 400,000 compared to the previous year. Given the growth in the number of graduates, the complexity of the employment situation and the enormity of the employment task have increased dramatically amid the influence of downward economic pressure, international dynamics and the ravages of the pandemic. In this case, the question of how to match supply and demand so as to solve the difficult employment problem has become a key challenge for the government.

Employment is fundamental to livelihood, and therefore it has great significance with respect to social production and development. Employment combines labor with means of production to create material and spiritual wealth. It provides workers with a source of livelihood through remuneration and facilitates continuous reproduction, in

addition to which it's conducive to the realization of workers' own value and the general development of humankind. The year 2020 was a decisive one for China, which needed to achieve a society that is relatively prosperous in all respects along with the goal, as stated in the Government Work Report, of "ensuring employment". In the short to intermediate term, the employment situation is related to the changes in the global epidemic and in the domestic economic situation. In China, the pandemic has been effectively controlled and the government has introduced a series of macroeconomic policies, thereby creating conditions for stable employment throughout the year. However, China, amid the continuing pandemic, requires a proactive fiscal policy and prudent monetary policy in order to provide a comparatively relaxed economic environment in which enterprises can survive and prosper. Additionally, it must deepen institutional reform in order to achieve the targeted level of employment.

The outbreak has had a dramatic impact to China's retail sector, especially physical retail, with department stores and cosmetics industries suffering the most. The rapid development of new formats has accelerated the digitalization of the retail sector, which is closely related to the country's livelihood and employment. From the results of the national economic census, the development of China's tertiary industry can generate incremental employment, and the elasticity of employment in the tertiary industry is reasonable.[2] Under the pressure of huge changes brought by the digital economy, the retail sector has created new consumption scenarios through technological innovation and thereby achieved rapid transformation despite the pandemic.

The new form of retailing has generated a huge market scale in recent years while providing a large number of employment opportunities to upstream and downstream related industries, which has created of huge social value. The pandemic has posed a challenge for the retail sector, but it has also forced the industry to see opportunities for development and has, to some extent, accelerated the transformation and upgrading of China's retail sector.[3]

Digital retailing can increase employment capacity and create opportunities, and many large companies are endeavoring to hasten the digital transformation. This is also a part of industrial upgrading. Under the background of the development strategy of "Internet Plus", new retailing has evolved from simple digital retailing, which is more closely linked to the economy than physical retailing. The new retail market is larger and more specifically delineated than traditional retailing, resulting in more diverse employment patterns. Additionally, in the process of retail-industry transformation, divisions ranging from upstream R&D, design and production to downstream service and logistics, are continuously creating new opportunities,

providing a large number of positions for fresh graduates' employment. During the upgrading process, which involves the Internet and cloud computing, many positions in regard to digital retailing are no longer overly dependent on people's geographic locations, and such changes will produce a more rational allocation of human resources.

Digital retailing has helped revitalize China's economy, which had lagged behind developed countries for many years, partly because China has low efficiency in terms of productivity and transaction. Exacerbating the issue is the fact that there is no complete social retail system for traditional industries. After years of development, China's retail sector has taken the lead in the digital era. The process of data-oriented transformation in retail is data-based and driven, and this has guided further industrial upgrading. Although there have been some studies on the relationship between digital retailing and employment, there is still a lack of systematic research on the impact of digital retailing on employment, while most of the current research on new retailing and employment is only regional in scale. The "New Retail Urban Development Index" compiled by the Guanghua School of Management, GSM of Peking University can fill the gap and lay a basis for an in-depth study of the relationship between digital retailing and employment in the paper.[4] Based on the index, this paper establishes data matching between the Digital Retail Development Index System and employment-related data so as to facilitate analysis of the relationship between digital retailing and employment in China. Thus, its findings complement the existing literature.

Hereinafter, Part 2 will review the literature involved in the mechanism of digital retailing to improve employment. Part 3 will introduce the data and empirical model. Part 4 will research the overall impact of digital retailing on employment and separately analyze the specific impact of production, logistics, service, transaction and environment under digital retailing to discuss how it can promote employment. Part 5 will conclude the paper and make recommendations.

2. Literature Review

Employment is the foundation of people's livelihood, which isn't only closely related to citizens' personal interests, but also has a far-reaching impact on social stability and macroeconomic development (Wang et al., 2020)[5]. Existing literature has relatively comprehensive analysis of the factors affecting employment, which can be divided into micro and macro aspects. At the micro level, such as gender (Zhu, 2020)[6], education background (Guo et al., 2019)[7], risk preference (Mo and Shi, 2020)[8], the development of artificial intelligence (AI) and Internet technology (Dou and Xiao, 2020)[9], taxes and fees (Wang et al., 2020)[10], income (Ye and Jiang,

2020)[11], etc., there is much discussion at the individual level about the factors that affect employment. At the macro level, the available literature shows that political environment (Hui and Liu, 2020)[12], trade environment (Zhao, 2020)[13], industrial structure (Duan and Guo, 2013)[14], changes in GDP (Dornbusch, 2003)[15] and natural disasters (Li et al., 2020)[16] all have a huge impact on employment in China. Among them, in the context of supply-side structural reform, the adjustment and upgrading of industrial structure will not only generate employment creation but can also diminish employment. Optimizing and balancing the employment structure is the key for the people's government to solve the employment problem (Li, 2020)[17]. Therefore, some of literature believe that if the industrial structure can't be upgraded, China's existing employment problem will be difficult to be effectively solved.

Thus, the tertiary industry has become China's largest employment industry, which occupies a pivotal position. The retail sector is connected with production and consumption, which is one of the most important components of the tertiary industry. Many researches have proved that retailing, as a labor-intensive industry, can provide a large number of positions in China. Qiuying Lv (2020)[18] found that rationalization will be a new model for the future development of the physical retail sector. As the main consumption object of community retail, the residents in the community are more and more in pursuit of enjoyment and experience. Therefore, retail stores must change the marketing concept, sales environment, product types, etc., employ more training personnel and technical personnel to establish a comprehensive sales platform and build a quality service system. According to Hao Zhang (2016)[19], the service-supply system of the retail sector must be upgraded in order to achieve the release of consumption potential. Currently, the retail sector generally adjusts the operation behavior of the sales link, but the optimization of the logistics channel is relatively neglected. In order to solve the time and space problems of commodity circulation, the people's government should increase the investment in the construction of infrastructure such as roads and logistics outlets, create an employment platform for relevant professionals and effectively expand the scale of employment through that platform. At the same time, the modern logistics distribution system industry will be improved (Guo et al., 2014)[20]. Additionally, using stochastic frontier model analysis, Ziwen Li et al. (2016)[21] found that efficient logistics can give rise to the advanced business model of chain operation, which can undoubtedly provide more employment opportunities and improve the local employment situation. Generally, the existing literature asserts that the retail sector can allocate resources efficiently and reasonably so as to engender an increase in jobs. If people have a reasonable willingness to work, the difficulty in finding jobs will be alleviated.

However, China's existing traditional retail sector isn't mature. The sustainable

development of economy is restricted by the problems of few strong brands of retail enterprises, small scale, poor shopping experience of consumers in physical stores and unreasonable distribution of physical stores (Mao and Lin, 2017)[22]. The disadvantages of the traditional retail sector seriously inhibit the increase of employment, but it also gives rise to the pioneering new mode of digital retail and even new retail, which leads the development in China and stands out in the world.

Given the development of economy and the progress of science and technology, based on large data, cloud computing, artificial intelligence, block the upgrading of traditional retail chains and other emerging technologies, digital and retail development to a new retail, through digital logistics, O2O mode to reduce operating costs, expand the scope of business, optimize service mode to provide broad space for development (Yang et al., 2018)[23]. Through the network, the new retail can eliminate many unnecessary links in the physical retail, so that the business scope isn't limited by the physical space and time, greatly reducing the operating costs, not only optimizing the supply of services in the retail sector, but also creating employment opportunities in the upgrading and transformation of the traditional retail sector (Wang, 2017)[24]. More specifically, the new logistics generated by the new retail model can achieve more employment of logistics management talents and help enterprises reduce costs and increase efficiency (Zhao and Men, 2019)[25]. The creation of consumption scenarios enriches the consumer's shopping experience, creates new sales spaces and channels, and encourages innovation throughout the supply chain (Wang, 2020)[26]. It should also improve employment. Therefore, as a model, new retail isn't simply a replacement for traditional retail but is complementary and integrated with traditional retail, thereby creating a new employment phenomenon in China. Accordingly, this article explains the promotion effect of new retail to employment from the following two points:

First, the new retail model can make up for the lack of geographical restrictions in the traditional retail sector. The modern logistics system makes product sales flexible, and underdeveloped areas can also enjoy fast and convenient sales services. The establishment of logistics platforms in underdeveloped areas can also promote local employment (Sun et al., 2019)[27]. China's infrastructure, such as logistics and distribution outlets, hasn't been completely improved, and consequently the radiation range of traditional retail in underdeveloped areas is small. Location and commodity types are the key factors that restrict its in-depth development. Without efficient logistics, fewer people are employed in retail. New retail drives the rapid development of the logistics industry with modern technology. Even in underdeveloped areas, the emerging logistics information technology can achieve "top speed" and "on time" while improving the shopping experience for consumers (Zhang, 2019)[28]. The

development of new logistics can't make up for the lack of senior logistics management personnel or for technical research and development personnel, and consequently the new retailing sector will play an important role in promoting employment.

Second, thanks to the development of Internet technology, the new retail, despite being based on the operation of the traditional retail sector, integrates VR (Virtual Reality), AR, 3-D projection and other technologies to design shopping scenarios. Moreover, it enriches the consumer's shopping experience with high-quality services (Jiao and Liu, 2019)[29]. The quality of service is the key factor for the development of the retail sector. The development of Internet technology makes high-quality service the lifeline of enterprises. VR technology, as applied in the new retail model, can open up the communication channels between online and offline transactions while providing customers with high-quality service and building a foundation for optimized local employment. Quality service isn't limited to excellent consulting, after-sales service, it is a set of consulting, experience, purchase, logistics, installation, after-sales service in one of the high quality service chain (Li and Wang, 2020)[30], high-end service personnel bring consumers high-quality shopping experience through high technology, but now these high-end service personnel are very rare, new retailing lecturers, new retailing sales, etc., are urgently needed talents, which is the opportunity and space for population employment.

Taking all these factors together, the growth of new retailing in China, especially the logistics and service development process it drives, could have a significant impact on employment in China. This promotion is based on the operation of the traditional retail sector, with the initial goal of making up the disadvantages of the traditional retail sector, and the production, logistics and service aspects are reformed in order to increase the number of employed personnel and optimize the structure of employed personnel so as to promote employment.

3. Materials & Methods

3.1 Data Specification

(1) Digital Retailing Development Index

Digital Retail Development Index Part I data come from Guanghua School of Management's *New Retail Urban Innovation Index Report 2018*. Based on the development and characteristics of new retailing, considering availability and reliability of data, the research established the new retail urban innovation index system from five major efficiency dimensions of production, logistics, service, transaction and environment (see Table 1). The data represented in Part 2 comes from

the relevant dimensional content of *Statistical Yearbook of National Bureau of Statistics* and *Report on the Development of China's Urban Digital Economy 2019-2020* of Guanghua School of Management (GSM).

The annual data presented in the Digital Retail Development Index increased from 62.78 in 2010 to 99.99 in 2020, thus indicating its rapid statistical development. To further determine which dimension of digital retailing can affect employment, the paper applies the five sub-indices of the Guanghua School of Management's New Retail Urban Innovation Index covering the production efficiency index, Logistics efficiency index, Service efficiency index, Transaction efficiency index and Environmental efficiency index, as the basis, and data gathered from the statistical yearbook and "Report on the Development of the Urban Digital Economy," doing so through AHP as the means to find the annual efficiency indexes covering production, logistics, service, transactions and environment.

The production efficiency index, which is generally compiled on the basis of talent flow in the region, the number of cloud computing users and the volume of cloud computing services, is an evaluation index of the digital retail production level. The annual value of the production efficiency index in the sample increased from 62.72 in 2010 to 92.11 in 2019, showing there was significant progress in the productiveness of digital retailing. The Logistics Development Index is a way to measure the logistics speed, the number of logistics outlets and the number of express boxes per household. The provincial standard value of the Logistics Development Index increased from 85.49 in 2010 to 95.46 in 2019, showing there was also strong development in logistics with respect to digital retailing. The service efficiency index is a reflection of the degree of service, focusing on the number of new formats in the region, the number of takeaway stores and the number of smart-branded stores. The provincial standard value of the service efficiency index in the sample increased from 75.28 in 2010 to 98.31 in 2019, thus indicating the continued optimization of service of digital retailing throughout the country. The transaction efficiency index is derived from data on the proportion of online retail transactions, the penetration of e-commerce users, penetration of imported goods, e-commerce of time-honored brands and the proportion of offline mobile payments. The provincial standard value of the transaction efficiency index in the sample increased from 83.82 in 2010 to 99.16 in 2019, indicating a significant progress in the efficiency of digital retailing transactions nationwide. The environmental efficiency index generally examines data such as the attention of society to new retailing, the number of times "retail" and "consumption" were mentioned in the Government Work Report, along with the development of electronic government. The environmental efficiency index in the sample increased from 82.18 in 2010 to 99.97 in 2019, indicating improvement in the

national digital retailing environment.

Table 1. New Retailing Urban Innovation Index System of the GSM

Level-1 Dimension	Level-2 Dimension	Specific Indicators
New Retailing Urban Innovation Index	Production efficiency index	Talent inflow
		Scale of cloud computing users
		Scale of cloud computing service
	Logistics efficiency index	Logistics speed
		Number of logistics outlets
		Number of express boxes per household
	Transaction efficiency index	Number of new formats
		Number of takeaway stores
		Number of smart brand stores
		Proportion of online retail transactions
	Service efficiency index	E-commerce user penetration
		Import goods penetration
		E-commerce of time-honored brands
		Proportion of offline mobile payments
		Social attention to new retailing
	Environmental efficiency index	Number of times gov't. work report mentions "retail sales" and "consumption"
		Development of e-government

(2) Changes in the Number of Employed Population

Data from the National Bureau of Statistics shows the information of the change of the employed population from 2010 to 2019. Therefore, this paper involves two aspects: the change in the figures for the employed population and the change rate of the employed population. Moreover, it incorporates a total of 240 valid observations.[31]

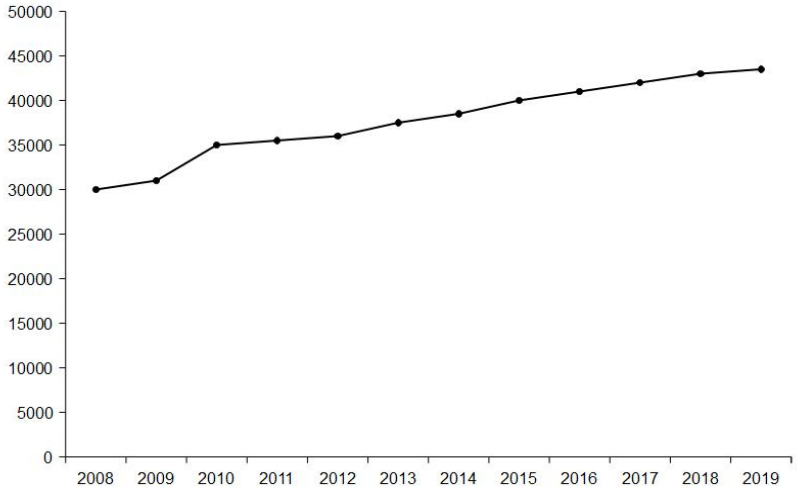

Figure 1. Changes in China's employed population

(3) Internet Penetration

Statistical report on Internet development in China from China Internet Network Information Center (CNNIC) shows that the Internet penetration degree reflected by the scale of Internet use from 2010 to 2020, covering all provinces (cities/autonomous regions) of the People's Republic of China (excluding Hong Kong, Macao and Taiwan). The national Internet penetration rate in 2019 is 61.2%, almost 1% relative to the figure of 60.35% for 2018 and 1.96 times the figure of 31.20% for 2010.

(4) Other variables

Other employment-related variables include real GDP per capita, digital retail sector standard wage, transaction scale of digital retailing, and the number of times the Government Work Report covered employment. The sources are statistics from the National Bureau of Statistics of China and the Government Work Report. The above variables will be used to describe the relationship between information related to digital retail development and some macro information and employment.[32,33]

3.2 Method & Variable Selection

First, the paper analyzes the influence of the development of digital retail on the number of new jobs. In this paper, the logarithm of new employment and the rate of change of employment are selected as explained variables, and the regression model is shown as follows.

$$\ln NEMP_i = \varepsilon_i + \alpha_i + \beta_0 + \beta_1 index_i + \beta_2 \ln \mathrm{A}VGI_i + \beta_3 \ln EMP\_GWR_i + \beta_4 \ln RGC_i + \beta_5 \ln VDR_i$$

lnNEMP is the logarithm of the change in the number of people in employment, while α describes some unobservable factors that don't change over time. INDEX represents the new retailing urban efficiency index. lnRGC is the logarithm of real GDP/population, which controls the factors of local economic development. LNAVGI is the standard wage logarithm of digital retail sector. LNVDR represents the logarithm of transaction size in the digital retail environment. EMP_GWR is the number of times the keyword "employment" is used in the Government Work Report.

The purpose of this paper is to examine whether the development of digital retail will boost employment. Specifically, this paper uses the National Digital Retail Development Index to measure the development of digital retail, and evaluates whether there is a statistically significant correlation between the index and the number of employed people. To identify the impact of digital retail on employment, two issues must be addressed: First is the problem of reverse causality, whereby changes in the employment picture may promote the development of digital retail in the local area instead of digital retail serving to promote employment. Second, even with control over the level of local economic development, the post-employment

wage level and the relevant market size, there will be other factors that cause the employment trend to change. However, such a change may have nothing to do with the development of digital retail.

With respect to reverse causality, this paper uses the instrumental variable strategy, and uses the Internet popularity as the instrumental variable of the new retail city efficiency index. First of all, the Internet is the basic guarantee of digital retail, and the development and change of digital consumption closely related. Second, as part of the retail development process, digital retail will be continuously optimized along with the progress made in the corresponding science and technology. However, after controlling for factors such as economic conditions there is no direct relationship between Internet penetration and the extent of change in employment, which makes Internet penetration may be a good instrumental variable. First, this paper makes a one-stage regression of digital retail efficiency index to Internet popularity and other variables to test whether instrumental variables are good or not. For other factors that may also affect employment, the paper deals with them as follows: First, the paper uses the fixed-effect model for the empirical analysis of the correlation between the development of digital retail and employment, in order to control the culture, public opinion, international situation and other factors that may simultaneously affect the development of digital retail and employment but don't change significantly in the short term. Second, the industry standard wage, per capita real GDP and digital retail transaction scale used in this paper are all logarithmic so as to avoid the poor estimation effect caused by multicollinearity. Table 2 shows the descriptive statistics of the variables used in the paper. As can be seen from Table 2, the development degree and employment situation of digital retailing in different periods are different.

Table 2. Descriptive Statistics for Core Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Digital Retailing Development Index	120	81.56967	9.604794	62.77773	99.9954
Production Development Index	120	79.17587	7.790374	62.72236	92.11051
Logistics Development Index	120	91.60025	2.526592	85.48983	95.45503
Service Development Index	120	88.0059	6.09085	75.27833	98.31061
Trade Development Index	120	92.42945	4.186783	83.8205	99.16245
Environmental Development Index	120	92.82515	4.742864	82.17572	99.97278
Logarithm of the Change in the Number of Employed Population	120	4.644183	0.2009818	4.094	5.049
Digital Retail Industry Standard Wage	120	7751.299	2199.666	3618.87	12225.05
Number of Times the Government Work Report Covered Employment	120	4145.017	1103.548	2180.388	6630.366
Real GDP / Population	120	3598.65	2997.49	252	12651
Transaction Scale of Digital Retailing	120	2.15	7.409567	0	36

4. Results

4.1 Analysis of Promotion

(1) Overall Impact of Digital Retailing on Employment

In this paper, the fixed-effect model is used as the benchmark model. Due to the inverse causality, sometimes the development of digital retail is high when the employment proportion among people is high and the employment situation is good, which may lead to the problem of endogeneity. This paper uses the Internet penetration as the Instrumental Variable, IV. Table 3 shows the first-stage regression results of the IV, Internet Penetration, on the digital retail efficiency index. F-test shows that the regression results are significant at a level of 0.001.

Table 3. Result of the 1st Stage IV Regression

	Digital Retailing Development Index
Internet Penetration	-727.8359***
	(169.7652)
Digital Retailing Industry Standard Wage	0.005881***
	(0.000493)
Transaction Size of Digital Retailing	-0.0001265
	(0.0004107)
Real GDP per capita	0.00892***
	(0.001563)
Number of Times the Government Work Report Covered Employment	0.292096***
	(0.0400788)
Time Control	YES
Sample Size	120

Note: *** P<0.01; ** P<0.05; * P<0.1. Similarly hereinafter.

According to Table 4, the dependent variable of the report is the fixed-effect regression data and instrumental variable regression data of the logarithm of newly employed citizens (LnNEMP) and the growth rate of the newly employed population (EGR), from which the p-value test results are obtained. Among them, columns 1 and 2 are the fixed-effect reference model, and columns 3 and 4 represent the model that applies FE&IV. The results showed that the dependent variable was the IV regression of LnNEMP, and the F test was 0.0052. The dependent variable is the IV regression of EGR, and we see that the test result of the F-P value is relatively poor.

Table 4 shows that no matter using the FE benchmark model or the FE&IV model, the regression results show that the higher the degree of digital retail

development, the more the number of employed population. Moreover, the table shows that popular employment propensity is sensitive to industry standard wages. High wages will increase employment intention, but it will also slow down employment growth to a certain extent. Moreover, the data prove a relatively poor correlation between the size of digital retail transactions and employment.

As for the significance of the above model, as shown in Table 4.

(Fixed effect): The index increases by 1 unit, and the newly employed population increases. (Fixed effect & IV): the index increases by 1 unit, the newly created employment population increases too, while the New Retail Urban Development Index rises from 62.78 in 2010 to 99.99 in 2020. Thus, there is a positive correlation.

Table 4. The Relationship between the New Employment and the 1st Dimension

Variable	FE		FE&IV	
	lnNEMP	EGR	lnNEMP	EGR
	(1)	(2)	(3)	(4)
INDEX	0.0204855***	0.0709364	0.0180047***	0.1193471
	(0.003964)	(0.0553187)	(0.0048948)	(0.0706394)
lnAVGI	0.8578865**	-2.807237	0.9867345**	-5.321654
	(0.2144949)	(2.993339)	(0.2617957)	(3.778088)
EMP_GWR	0.0039599**	0.0264804	0.0045949**	0.0140889
	(0.0012935)	(0.0180505)	(0.0015046)	(0.0217129)
lnRGC	-0.6654169***	-1.615172	-0.6401341***	-2.108555
	(0.114511)	(1.598035)	(0.1219367)	(1.759722)
lnVDR	-0.1108237*	-0.3994244	-0.1156576	-0.3050931
	(0.0557674)	(0.7782499)	(0.0581398)	(0.8390413)
Time Control	YES	YES	YES	YES
Sample Capacity	120	120	120	120
R^2	0.9968	0.8779	0.9965	0.8592
F-P			0.0052	0.3427

Note: *** P<0.01; ** P<0.05; * P<0.1. Similarly hereinafter.

(2) Integral Impact of Digital Retailing on Employment

The New Retail Urban Development Index is composed of five sub-indexes including Production efficiency index, Logistics efficiency index, Service efficiency index, Transaction efficiency index and Environmental efficiency index. Accordingly, this paper employs analysis to determine which aspects in the development of digital retail can promote employment among the population. The promotion effect may be due to the increase of urban production capacity, improvement of the logistics level, optimization of service, enhancement of transaction convenience, improvement of the environment or even multiple factors concurrently. Table 5 shows the correlation between the development degree of the five dimensions and the change of the

employed population. Among them, the fixed-effect model was applied in columns 1 to 5, and the IV fixed-effect model was applied in columns 6 to 10.

Table 5 shows that the development of digital retail production, logistics, services, transactions, and environmental dimensions is conducive to improving employment. Specifically, the optimization of production efficiency, the in-depth organization of talent teams, and the expansion of cloud computing users and service scale can directly improve the employment situation to some extent. The data on logistics development reflects the development experienced in the logistics industry with respect to timeliness, the numbers of outlets and numbers of express-delivery cabinets, which can provide jobs and generate a new employment structure. The service dimension, which represents the number of new formats and stores, reflects the creative ability of regional enterprises. The more businesses there are, the more jobs there will be. The enhancement of the transaction dimension indicates that payment is more efficient and transaction is more convenient, which can facilitate cost reductions and promote model innovation. The environmental dimension reflects the high degree of social concern, and accordingly the relevant employment opportunities are explored.

Table 5. The Relationship between the Number of New Employment and the 2nd Dimension

lnNEMP	FE					FE&IV				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INDEXP	0.0267728**					0.0343083**				
	(0.0097868)					(0.0121857)				
INDEXL		0.1238823***					0.2031961**			
		(0.0267275)					(0.0778514)			
INDEXS			0.037995**					0.0449992**		
			(0 .0106395)					(0.0132101)		
INDEXB				0.0809443***					0.0881411***	
				(0.0152761)					(0.0185838)	
INDEXE					0.0720625**					0.082943**
					(0.0181867)					(0.0223919)

(Table. 5 Continued)

lnAVGI	0.9836107**(0.3561358)	1.7790 4***(0.0726793)	0.8991256**(0.2974672)	0.9578626***(0.1912302)	0.8869265**(0.2716006)	0.7195226(0.4389307)	1.6875 84***(0.141497)	0.7105844(0.3653367)	0.8721515**(0.2293668)	0.7306598*(0.3306985)
EMP_GWR	0.0044087*(0.0021695)	0.0037698**(0.0014645)	0.0036 95(0.0018785)	0 .0031704*(0 .0013832)	0.0035772*(0.0017326)	0.0030592(0.0025673)	0.0002 91(0.0037131)	0.0026795(0.0022174)	0.0026 34*(0.0016009)	0.0027277(0.0022028)
lnRGC	-06359677**	-0.8952451***	-0.6713632***	-0.7399299***	-0.6932988***	-0.6864424**	-1.176058**	-0.7109471***	-0.7651174**	-0.729032***
	(0.182914)	(0.1506649)	(0.1553066)	(0.1177442)	(0.1454389)	(0.1981915)	(0.3375322)	(0.1668998)	(0.1253957)	(0.1557298)
lnVDR	-0.0951771(0.0903339)	-0.2437499**(0.0636763)	-0.1405794(0 .0738652)	-0.1531692**(0 .0540763)	-0.1467399*(0 .0683613)	-0.0795381(0.0964669)	-0.3032975**(0.1161909)	-0.1387061(0.0770238)	-0.1533851**(0.0552642)	-0.1461357*(0.0707691)
Time Control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sample Size	120	120	120	120	120	120	120	120	120	120
R^2	0.9919	0.9962	0.9943	0.9969	0.9951	0.9909	0.9894	0.9938	0.9968	0.9947
F-P						0.0349	0.0043	0.0136	0.0007	0.0023

Note: *** P<0.01; ** P<0.05; * P<0.1.

This paper, in addition to describing the effect of the development of digital retailing on the popular employment, also analyzes its effect on the growth rate of employment. Table 6 shows that the more efficient digital retailing is with respect to the five dimensions, the faster the growth in popular employment will be. However, this paper didn't obtain perfect statistical significance, which will require additional research.

Table 6. The Relationship between the Employment Growth Rate and the 2nd Dimension

EGR	FE					FE&IV				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INDEXP	0.1236783(0.0818544)					0.1526358(0.0975634)				
INDEXL		-0.0048741(0.3929524)					0.9040102(0.9910122)			

(Table. 6 Continued)

INDEXS			0.1457006 (0.1102589)				0.2001993 (0.1344957)			
INDEXB				0.2406147 (0.2267658)					0.3921356 (0.2817353)	
INDEXE					0.2678166 (0.2038117)					0.3690097 (0.2483154)
lnAVGI	-3.457271 (2.978621)	0.8827711 (1.068544)	-3.044867 (3.08271)	-1.988505 (2.838709)	-2.969232 (3.043728)	-4.472115 (3.514251)	-0.1652546 (1.801192)	-4.511881 (3.719586)	-3.793077 (3.477252)	-4.422567 (3.667284)
EMP_GWR	0.022488 (0.018144 8)	0.044851 5 (0.021531 3)	0.023514 (0.019467)	0.026703 7 (0.020532 9)	0.023727 9 (0.019416 5)	0.017301 9 (0.020554 7)	0.004986 5 (0.047266 5)	0.015612 8 (0.022576 1)	0.015410 3 (0.024269 7)	0.015827 3 (0.022489)
lnRGC	-1.720644 (1.529842)	-0.874957 (2.215103)	-1.715633 (1.609467)	-1.734333 (1.747849)	-1.771758 (1.629881)	-1.914611 (1.586799)	-4.092887 (4.296631)	-2.023633 (1.69925)	-2.264631 (1.901027)	-2.104089 (1.726967)
lnVDR	-0.280968 2 (0.755527 5)	-0.533989 1 (0.936181 1)	-0.498681 6 (0.765476 8)	-0.544866 6 (0.802732 7)	-0.522778 6 (0.766100 4)	-0.220870 1 (0.772351 7)	-1.216366 (1.479057)	-0.484106 2 (0.784198 8)	-0.549412 (0.837818 4)	-0.517160 2 (0.784794 2)
Time Control	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Sample Size	120	120	120	120	120	120	120	120	120	120
R^2	0.8886	0.8377	0.8797	0.8676	0.8794	0.8858	0.6641	0.8739	0.8557	0.8734

4.2 Path Analysis

The data indicates that the higher the degree of digital retail development is, the more additional employees there will be and, consequently, the faster the employment rate will climb. In view of the above employment changes, digital retail production, logistics, service, transaction, environment and other links are effective ways to promote population employment. The relevant factors of production efficiency and environmental efficiency have been discussed and studied in the existing literature, and consequently this paper won't repeat them. The article is further prepared to

explain the way that digital consumption will improve employment. As stated in the literature review, the correlation between digital retail and employment involves the following two paths: The first is logistics development, and the second involves the service-chain optimization of integrated services and transactions.[34]

(1) Development of Logistics

The logistics industry is a compound service industry, that is, connecting transportation, warehousing and other industries, an important strategic industry to promote economic development. Logistics agglomeration development, through scale economy, density economy and so on to reduce costs, beneficial to the development of the industry. Importantly, logistics agglomeration also is able to improve employment.[35,36] In the process of industrial upgrading of the logistics industry, the improvement of its output level has a significant promotion effect on employment.[37,38]

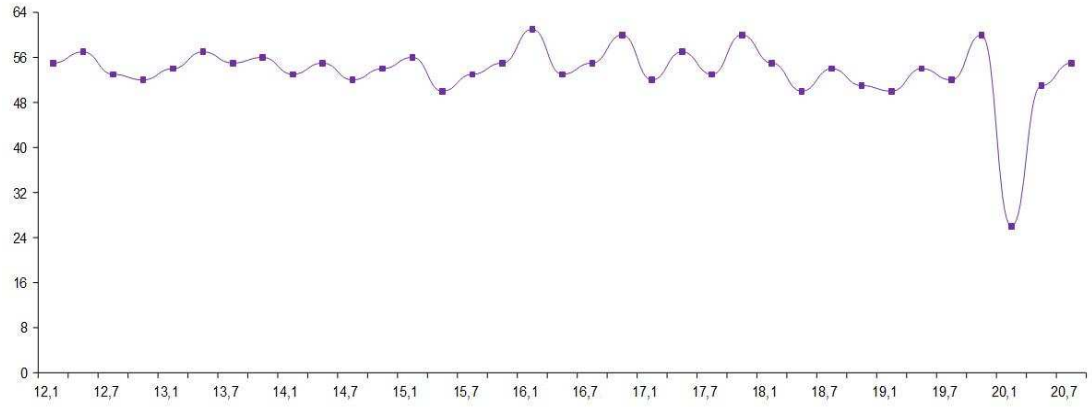

Figure 2. China's logistics-industry climate index

LPI is a composite index weighted by five dimensions, including business volume, employees, inventory turnover time, new order volume and equipment utilization degree, which basically shows the operation of China's logistics industry.[39] Table 7 shows that the reported dependent variables are the fixed-effect regression data and instrumental variable regression data of LPI, and the P-value test results of the instrumental variable are obtained, wherein columns 1 and 2 are the fixed-effect baseline model, and columns 3 and 4 are the model for which IV is applied.

Table 7 shows that the mixed OLS benchmark model is applied so as to control LPI, Indexl and RGC for regression. The result shows that as the development degree of digital retail's logistical dimension rises, the more prosperous the logistics industry is. Due to its attributes, the logistics industry is a labor-intensive one that employs a large number of people. In the process of logistics development, it naturally has the ability to drive employment. Moreover, the digital retail efficiency index has a

positive relationship to the coefficient of LPI. Accordingly, this article asserts that the digital retail compound optimization of the logistics industry with respect to the degree of structural optimization is high, but in direct relation to business data, such as the volume and number of staff persons, it may not be a positive correlation but is likely to be some sort of streamlined upgrade. This aspect of the research proved to be late.

Table 7. The Relationship between LPI and Index and Indexl

LPI	Mixed OLS	
	(1)	(2)
INDEX	-0.0044114***	
	(0.0012744)	
INDEXL		0.0059282**
		(0.0028947)
Other Variables	Controlled	Controlled
Time Control	YES	YES
Sample Size	120	120
R^2	0.5265	0.6419
F-P	0.000	0.000

Note: *** P<0.01; ** P<0.05; * P<0.1.

(2) Optimization of Service Chain

The new retail sector has developed dramatically in recent years, driven by upgraded consumption. New retail is a model that uses Internet big data and advanced technologies such as artificial intelligence to optimize the process of commodity production, circulation and sales, thereby reshaping the industry and integrating every link in the service chain.[40]

Virtual reality technology brought by the development of science and technology enables new retail to open up communication channels, provide customers with quality services, and create conditions for employment optimization. The phrase "high-quality service" refers to a chain that integrates experience, logistics, installation, consultation and after-sales service. High-end employees are required in order to convey a high-quality shopping experience to consumers. However, there are few high-end employees in new retail, and new retail lecturers and new retail sales are in urgent need of talents, which reflects the promising prospects of relevant employment in China's retail sector.

Consulting service, as the first link in the service chain, has developed under the new retail model, which encompasses the aspects from offline consulting to store consulting and from online and offline simultaneously. In terms of the transaction of daily commodities, whereas customers previously had to go from store to store for consultation, selection and purchase of commodities, they can now conduct online

consultation first through the online retail platform and then purchase offline at the store.

Online consulting has become a common occupation that encompasses customer service, consultation on products and services, etc. Amid the gradual improvement of regulations and policies, consumers can use online consultation to obtain better and better services. For example, people with professional skills that can be provided as consulting services to clients--such as those offered by doctors, lawyers, teachers and other professionals--are gradually becoming part of the consumer's life. Banking provides an example of scale. By 2018, the number of online consultants in the banking industry was 51,200. Thus, it can provide jobs for the unemployed and enable them to get second jobs or obtain jobs in a variety of ways. As a result, it facilitates the scientific allocation of social resources and is therefore conducive to social stability.

Given the vigorous development of e-commerce, the online-offline shopping model is increasingly popular. VR, AR technology for the retail sector to inject new blood. Retailers use virtual reality technology to allow customers to understand and even use goods in virtual environments without physical objects. High-tech products permeate the daily life of residents, and some new positions such as VR technology artists arise at the most fortuitous moment. VR technology alone is expected to create 135 million jobs in China by the end of 2020.[41]

Additionally, the optimization and development of logistics service is an effective way to improve employment in China, but service quality is the key factor. The logistics system consists of transportation, distribution, loading, unloading, handling, storage and storage, etc., but it isn't limited to transportation because the development potential of high-end support services is significant. Given the development experienced in the logistics industry, the supply of high-end employees will fall short of the demand. Overall, after the number of employees has reached 50.12 million, it still maintains an annual growth rate of 10% - 20%, but most of them are basic labor. In a good industry development prospects, there is still a gap in high-end talents.

As an emerging industry, the new retail sector can provide a large number of jobs for the society, and the optimization of logistics, service and transaction process is closely related to the improvement of employment. Given the development of technology, new retail and various technologies are deeply integrated, which obviously requires a large number of high-end technical and service practitioners. The upgrading of employment structure can also deliver a large number of new jobs, which reflects the ecological and experiential characteristics of digital retail.[42,43]

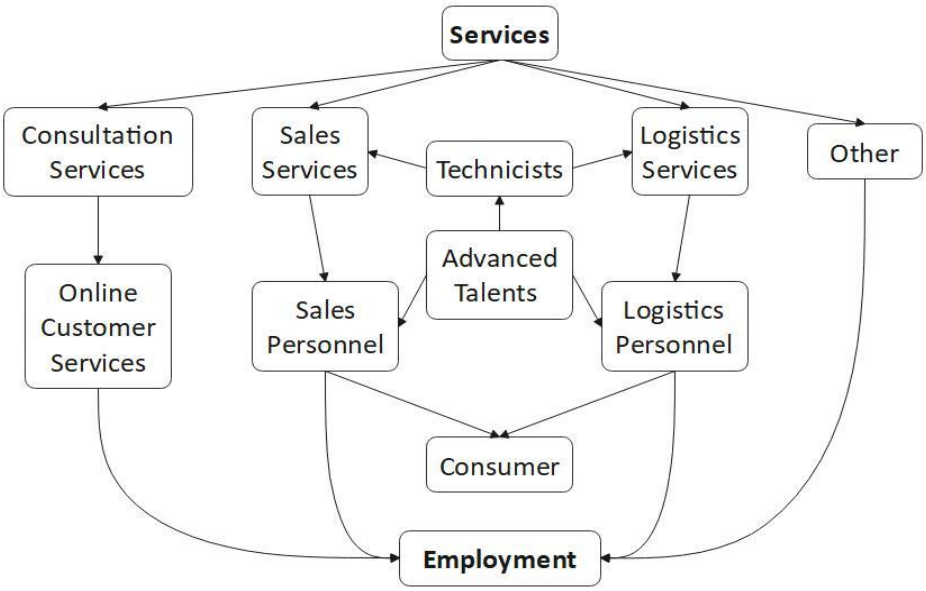

Figure 3. Service-chain optimization for improved employment

5. Discussion and Conclusions

China's economy is shifting from high-speed development to high-quality development. Against the background of easing social conflicts, the severe employment status remains a shackle for the country's development. In recent years, the Chinese government has been firm in the path of employment stability and strived to provide a suitable environment for employment. At the end of 2020, under the guidance of Xi's Thought on Socialism with Chinese Characteristics for a New Era, all regions and departments have achieved remarkable effectiveness of coordinating epidemic prevention and control, and economic and social development was revealed. For example, not only prices were generally stable but the market expectations were positive too. The national economy continued to operate in a stable recovery, and employment was improved to a modest degree. Employment is fundamental to livelihood. In the context of economic development and social progress, in the face of the complex employment situation, the Party Central Committee and the State Council attach great importance to the employment of citizens, and various departments focus on assisting provinces to promote special action for the tasks of "stabilizing employment" and "ensuring employment".

Given the integration of Internet capital and the development of information technology such as cloud computing, AI and big data, the retail sector has been given new opportunities. Employment will be created in the process where enterprises are continuously upgrading the production, circulation and sales of commodities. The

expansion of the scale of digital retailing will bring forth new occupations and positions. The comprehensive combination of online and offline will propose higher requirements for business managers and operators, and higher-level work will emerge. The emergence of digital retailing, with the vigorous growth of online and offline consumption, will release the potential of social consumption, and it thus drive the development of logistics, manufacturing, design, etc., driving employment, boosting domestic demand and promoting economic growth.

This paper discussed the relationship between digital retail development and employment by matching Digital Retail Development Index with citizen employment data. Through empirical analysis, the paper draws a number of conclusions, which are outlined below.

First, starting from the change in the number of citizens employed, the paper finds that the development of digital retailing can significantly promote citizens' enthusiasm for employment. The greater the digital retail development is, the more additional employees there will be and the higher the employment growth rate will be. Digital retailing establishes a consumer-centered shopping model, which enables enterprises to communicate directly with consumers and grasp consumer demand in real time, thus improving the efficiency of services that retail enterprises and upstream suppliers will know about consumption trend through interaction of internal and external information so as to formulate production and purchasing plans. Through digital analysis, enterprises will adopt new supply-chain management models, adjust their organizational structures, upgrade their logistics and distribution models, and enhance the production, logistics, transactions and environment of digital retailing. Meanwhile, optimized production efficiency, increased talent introduction, expanded scale of service and the proliferation of business formats and stores can, to an extent, provide more positions and improve employment. The path is equally robust when discerned on the basis of instrumental variables, and this proved that digital retailing has a positive correlation with employment.

This paper, while exploring the mechanism behind the promotion of employment by digital retailing, also finds that the processes of logistics, service and transaction in digital retailing play a significant role in the promotion of employment. First, the logistics industry integrates multiple industries. The development of the logistics cluster reduces costs, and has an ability to improve employment. The optimization of logistics business orders, employees, inventory turnover, equipment utilization and other dimensions also serves to promote employment. Second, the service chain integrating consultation, experience, purchase, logistics, installation and after-sales has a great demand for high-end employees. Therefore, the digital retail sector can optimize the employment structure and provide jobs for society. The optimization of

logistics, service and transaction processes is closely related to the improvement of employment, which also reflects the ecological and experiential characteristics of digital retail.

It is important to study the impact of digital retail development on employment, both in terms of academic value and policy recommendations. The paper concluded that the digital transformation - digitalization is a major trend in the development of the retail sector, and that the application of new digital technologies as the means to create new business models will provide more employment for society. It is important to continuously promote the development of digital retailing and improve all aspects of digital retailing. For example, we must enhance production efficiency, optimize logistics, enrich service connotations and improve transaction standards. With a better environment, more functions of digital retailing will be mined in order to make up for various problems such as the low level of integration and capability of traditional retail, service aspects that should be improved and the low level of personalized development. Then it can fulfill its role in promoting employment and improving the economy so as to enhance the consumer experience through the integration of online and offline transaction processes.

Limitations are inevitable, however. In the context of this paper, the dependent variable is the change in the number of employed persons rather than the realization of stable, sustained long-term employment for all or most citizens. The positive impact of digital retailing on employment can be interpreted as the creation of positions by companies through digital transformation. For example, the deployment of cloud technology and cloud services has enhanced the user experience and optimized the aspect of store layout, particularly with the new types of positions that are intelligent, specialized and cross-sectoral. As a result, the upgraded quality of consumption has been strongly influenced by digital transformation. However, it isn't yet possible to ascertain whether all these new types can be matched and whether they can contribute to economic development. Because many SMEs in the retail sector have chosen digital transformation, it isn't known whether their performance will improve after the transformation. It is difficult to predict whether they will grow and drive employment in the long run or face elimination and unemployment. There are risks to the development of digital retail transformation, and these risks require further examination. Future research could further explore the specific outcomes of digital retailing support for employment to fully demonstrate its role.

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