

Factors Influencing the Foreign Direct Investment Inflow in the Service Sector in China

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Abstract

Background and Aim: With the development of informatization and industrial structure adjustment, the service sector has become an important pillar of many developed countries. However, compared with developed countries, China's service sector doesn't account for a high proportion of GDP. As a developing country, China still needs foreign capital inflows to help it narrow the gap and promote the development of its service sector. Therefore, identifying the key factors especially digitalization that influence FDI inflow in China's service sector can help them improve the development level of the service sector and economic growth and transformation more quickly.

Materials and Methods: Dunning's eclectic paradigm is a solid foundation for this paper. This paper applies the ARDL econometric model by using yearly data from 1992 to 2021 to examine factors influencing FDI inflows in the whole service sector in China. The data sources are National Bureau of Statistics of China and the World Bank.

Results: GDP per capita, unemployment rate, and the penetration rate of the mobile phone have significant effects on the inflows of the FDI in China's whole service sector and the specific industry which is the wholesale and retail trade industry in the long-run and short-run. The results of residuals of the error correction model evidenced that the coefficients in these two models are stable.

Conclusion: Market size, unemployment, and especially the degree of digitalization are key factors influencing the FDI inflow in China's service sector. The government and policymakers can attract FDI inflow by improving the market economy reform and prompting more job opportunities. At the same time, it is necessary to increase investment in R&D and innovation in science and technology and to emphasize the development of high-tech and knowledge-based industries. More research can be conducted on more service industries in the future.

Keywords: Foreign Direct Investment; Service Sector; Digitalization

Introduction

Currently, China's comprehensive national strength and contribution to the world economy are increasing. China is also considered by investors as a worthy investment destination (Bose, 2012). The main sectors and industries driving China's economic growth include services, agriculture, manufacturing, and technology. Figure 1 showed that China's industrial structure has changed from improving agricultural productivity, emphasizing industrialization after the reform and opening up, to the current emphasis on high technology and high industrialization.

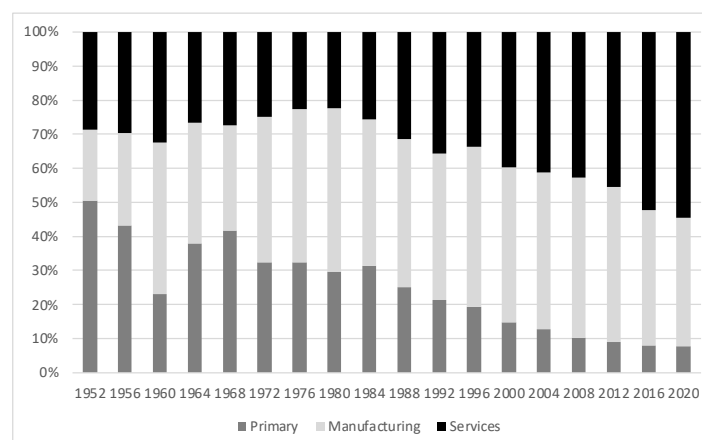


Figure 1. Share of the Three Sectors in China at Different Phases, 1952-2020 (Unit: Percentage)

Note: National Bureau of Statistics

[545]

In recent years, the service sector has continued to expand, becoming the main driving force for China's economic development. The total value of the service sector represents 53.3% of the GDP, and has the highest proportion of the GDP in China (National Bureau of Statistics of China, 2022). Furthermore, China emphasizes the development of high-tech and high-value-added enterprises, including e-commerce, online banking, online education, and telemedicine. Advancements in digital technology, e-commerce, cloud computing, and telecommunications have transformed many service industries, leading to improved efficiency, convenience, and access to services (Legner et al., 2017). However, the development of the digitalization needs technical and financial support.

Capital drives the aggregation and allocation of various production factors and also promotes the development of social productivity and economic growth. Capital inflows do not only provide financial support but also transmit knowledge and high human capital from developed countries to developing countries (Balasubramanyam et al., 1996). FDI is a key element of international economic integration, as it creates a stable and long-term connection between economies (OECD, 2023). Developing countries including China can also benefit from FDI by imparting technical knowledge, upgrading the workforce's skills, generating business opportunities for local businesses, and creating higher-wage jobs (Cheung & Ping, 2004; Lin et al., 2009). Furthermore, FDI is positively associated with the service exports (Srivastava, 2006). FDI inflows in China have not only risen over time, but the direction of investment has also gradually shifted from the manufacturing sector to the service sector in the last two decades. The changing trend can be shown in Figure 2.

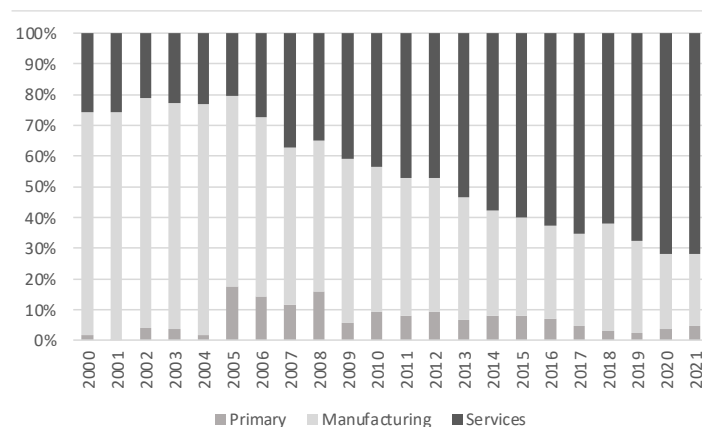


Figure 2. Shares of the FDI Inflows in the three sectors in China, 2000-2021 (Unit: Percentage)

Note: National Bureau of Statistics of China

Although China has become one of the countries with a strong capacity to absorb foreign investment, it's still the largest developing country. There is still a large gap between China's GDP per capita and that of developed countries. At the same time, the degree of service development is an important economic indicator. Countries with well-developed service sector are usually able to provide more high-quality service products and services and enhance their position in international trade. Meanwhile, the share of services in China's GDP is still a big gap with developed countries. At present, labor-intensive industries are still dominant in China's economy due to the country's large population and large labor base. A significant number of enterprises are still using traditional production and service modes, and their competitive strategies mainly rely on cost advantages and price competition, with a relatively slow speed of technological progress, product development, and industrial upgrading. Therefore, China needs foreign capital inflows to help improve its innovative technology and production efficiency, solve labor employment and livelihood issues, accelerate modern development, and promote China's early becoming a developed country.

Empirical evidence showed that the upgrading of China's industrial structure must create a good investment environment to attract more foreign capital to flow in the tertiary industry, and bring positive foreign capital spillovers (Qiong & Minyu, 2013). As the largest industry in China, the service sector can be expected to become the most attractive area for foreign capital. At the same time, the service industry also needs the inflow of foreign capital to promote the upgrading of the industry. Accelerating the development of the service sector can more quickly drive the overall development of the broader economy. Therefore, this paper is interested in which factors can enhance FDI inflow in the service



sector in China in modern society. While previous studies have focused more on economic and political factors, this paper will consider the current era of rapid information technology development, where the degree of digitalization may affect the flow of foreign investment. The findings of this paper will fill this gap and help the Chinese government and policymakers better understand and grasp the trends of the digital era to formulate more precise and effective policies to well promote the positive and healthy development of the service sector and also the national economy.

Objectives

1. To conduct a comprehensive literature review to identify key factors, including economic and technological factors, influencing the FDI inflow in China's service sector.
2. To provide feasible implications for attracting FDI inflow in China's service sector, thereby promoting the development of this sector.
3. Given current economic trends, the degree of digitalization is an innovative point to provide a more relevant and timely perspective.

Literature review

1. Theoretical Foundation:

In recent years, Dunning's eclectic paradigm has been the main theoretical model used to explain the expansion of MNEs into countries other than their home countries (Cantwell, 2015). The eclectic paradigm, also known as the OLI framework, is an economic method that summarizes the three common elements that determine international investment (Dunning, 1980).

These three parts are separate but related, the first advantage is ownership (O) which is a precondition for FDI. It refers to intangible assets such as unique skills and technology, brand value, and specific management. The firm must possess competitive advantages not shared by the other firms in the foreign country. Helpman et al. (2004) indicated that only enterprises with higher productivity will choose to serve foreign markets, and the highest productivity enterprises will choose to serve foreign markets through FDI.

The second is location-specific (L) advantage. It emphasizes the importance of location to the decision of foreign investment. It usually includes the lower cost of labor and transportation, the large and stable market, or this region has sufficient labor. These factors that are beneficial to the development of the parent company will attract FDI inflows in the host country. Bellak et al. (2008) found that labor cost as a country-level cost-related location factor as a determinant of FDI in Central and Eastern European countries through the OLI paradigm. Higher unit labor costs have a negative impact on FDI, while higher labor productivity has a positive impact on FDI. Nielsen et al. (2017) concluded that firms are more likely to locate their foreign investments in regions with good demand conditions by the OLI framework.

The last one is internalization (I). When MNEs have ownership and they find the host countries that suit their development, FDI is more profitable for the enterprises to control these advantages internally. It can exploit their ownership advantages more effectively and reduce dependency on external parties.

Investors not only consider economic factors, but political stability is also a key determinant of FDI. Buchanan et al. (2012) concluded that good institutional quality such as stable politics, and a sound legal system has a positive effect on FDI, while it is negatively correlated with FDI volatility. The findings suggest that political stability is the most important factor in FDI flows to Asia-Pacific countries (Rashid et al., 2017). Su et al. (2022) also concluded that increased economic policy instability would weaken the confidence of foreign investors to invest in FDI in China.

Overall, the current empirical evidence showed that at the country level, a good economic and legal system, stable politics, low labor costs, and high labor productivity have a positive effect on attracting FDI inflows. Now China proposes to maintain the basic stability of attracting total foreign investment and continue to optimize the structure of foreign investment utilization. Foreign investment will be guided to the tertiary industry. However, since China's service sector has only recently emerged, there is also a lack of literature research on this aspect. Based on this goal and previous studies, this



paper uses the eclectic paradigm as the theoretical background to study the factors influencing the FDI inflow in the service sector in China.

2. Service Sector:

The concept of the service sector originated from the concept of "tertiary industry" in Western countries. Fisher (1935) first proposed the concept of "tertiary industry" in his book "Clash of Progress and Security", which was used to divide the industrial structure of the national economy, thus forming the classification of three industries¹. According to Fisher, "tertiary industry" generally refers to tourism, entertainment, culture, art, education, science, government activities, and other sectors mainly providing non-material products. In 2003, the National Bureau of Statistics of China issued the Notice of the National Bureau of Statistics on the Issuance of the Provisions on the Division of Three Industries, clarifying that the tertiary industry is the service sector, and the tertiary industry refers to other industries other than the primary and secondary industries. It mainly includes transportation, communications, commerce, catering, finance, education, public services, and other non-material production industries.

Since the 1960s, there has been a general trend of transformation from an industrial economy to a service economy in the world, and the proportion of the service sector in employment and GDP has been increasing. The service sector has become a dominant force in the economies of developed countries, including both high-wage tech and innovation companies as well as the general retail restaurant industry, which provides a large number of jobs for workers. The level of human capital also has a positive impact on the development of the tertiary industry in Shandong Province, China (Fang & Chao, 2015). Noland et al. (2012) pointed out that many Asian countries are maturing in manufacturing and lagging behind in services, which makes the development of services the priority task for Asian developing countries. Since China acceded to the World Trade Organization, the status of China's service sector in the national economy has rapidly improved. The situation which China mainly relied on the secondary industry to drive economic growth was changing (Dexu, 2007).

Although China's service sector is growing and has become the largest sector in China, there is still a gap compared with the share of the service sector in developed countries, and the share of knowledge-intensive services is not high. However, knowledge-intensive and technology-intensive can create higher added value and move up the value chain, contributing greatly to the service sector and the national economy. Therefore, optimizing the structure of services is a major challenge for China.

3. Modern Service Industry:

Modern service industry refers to the knowledge, technology, and information-intensive service sector which is developed by relying on high and new technology and modern management methods, operation modes, and organizational forms, and which mainly provides intermediate input to producers. The degree of modern service industry development has become one of the important symbols to measure the modernization and competitiveness of the region.

The development of the modern service industry played an important role in promoting rapid economic development, accelerating social progress, and building an innovative and harmonious society (Wu et al., 2015). China could not arrive as the world's second-largest economy without information technology and high-tech industries. Ji (2022) reported that the value-added of Information Transmission, Software, Information Technology, and Financial Intermediation increased by 17.2% and 4.8% in 2021, respectively, compared with 2020, which together contributed 1.9 percentage points to the growth of the value-added of the services sector. Li and Meifeng (2013) pointed out that the U.S. is extremely export-competitive in technology-intensive services, while China is in a relatively weak position in technology-intensive services. Sabbagh et al. (2012) mentioned that digitalization plays an important role in the country's employment. A 10% increase in digitization leads to a 0.84% decrease in a country's unemployment. This is important for a country with a large population like China.

¹ According to the Classification of National Economic Industries, the scope of the three sectors is as follows. The primary industry refers to agriculture, forestry, animal husbandry, and fishery. The secondary industry refers to the mining, manufacturing, production and supply of electricity, gas and water, and construction. The tertiary industry refers to industries other than the primary and secondary industries.

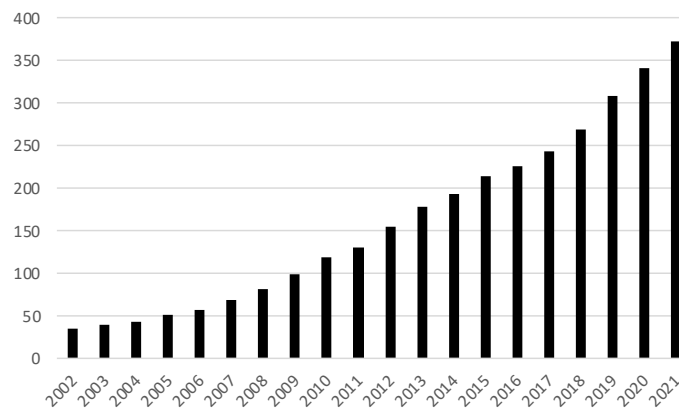


Figure 3. Expenditure on R&D funds of scientific research and development institutions, 2002-2021
(Unit: Billions of Chinese Yuan)

Note: National Bureau of Statistics of China

Figure 3 showed the increasing trend of China's spending on research and experimental development in R&D institutions over the past 20 years. It also indicated that China attaches great importance to innovation and scientific and technological development. However, the current financial support is not enough, China needs more capital inflow and also advanced technology to support it.

4. Foreign Direct Investment:

FDI plays a vital role in the countries' economic development, it is an important driving force in the economy. FDI can lead to the development of new industries, expansion of existing industries, and productivity and efficiency gains in domestic industries through the transfer of capital, expertise, and technology.

At present, much literature has studied the relationship between FDI and developing countries' economies. Liang et al. (2021) indicated that there is a positive relationship between FDI and economic growth in developing countries. Wei and Zhang (2017) indicated that FDI has a significant role in promoting the economic growth of ASEAN countries. Gul et al. (2012) found that there is a positive correlation between FDI and the economic growth of Pakistan. Meanwhile, there also found a positive but not very strong association between FDI and inflation. However, under the OLI framework, the ownership advantages of MNEs can be translated into monopoly power, such as advanced technology, management knowledge and skills, and other intangible assets. In response to the argument that FDI may discourage domestic private investment through competition in developing countries, Al-Sadig (2013) stated that FDI not only brings in external finance but also has a positive impact on domestic private investment in the host country. It can stimulate private investment in the host country through the spillover of technology and knowledge. Therefore, developing countries should emphasize the FDI inflows. In China, the FDI inflow has gone through different stages over the past 70 years. Now, China implements the policies of open and high-quality development on FDI because the FDI can benefit China to promote economic growth faster. Tian et al. (2004) concluded that provinces with a higher proportion of FDI have faster technological updates and faster economic growth. Hong (2014) also concluded that FDI has a positive impact on China's economic development.

Empirical evidence from Panigrahi and Panda (2012) showed that the GDP of the country, gross capital formation, capital infrastructure, external debt, and export and import volume are the major factors that significantly influence foreign capital inflow in some Asian countries including China. Ang (2008) indicated that the development of finance, infrastructure development, and an increase in trade openness will boost FDI inflows to Malaysia. Li et al. (2017) indicated that preferential policies have a positive relationship with FDI inflows. However, Hong (2014) expressed that trade openness has an insignificant role in the attraction of FDI and an insignificant role in the improvement of China's economic growth. From a political perspective, Bissoon (2012) showed that efficient institutions and less corrupt regulatory regimes will have a positive impact on FDI inflows. Since this paper wants to study the factors that influence FDI inflows in China's service sector, these articles can provide us with references on the choice of variables.

5. FDI in the Service Sector:

Many scholars have studied the relationship between FDI flows into the service sector and the economic development and productivity level of the host countries. Empirical evidence from Fernandes

and Paunov (2008) concluded that there is a positive and significant effect of services FDI on the productivity growth of Chilean manufacturing plants. Inekwe (2013) also showed that FDI inflow in Nigeria's service sector has a positive impact on Nigerian economic growth. In the same year, Duggan et al. (2013) found that the degree of FDI restrictions is negatively correlated with the performance of the services sector. FDI inflow in the service sector also has benefits to the economic growth in China. Latorre et al. (2018) indicated that the impact of foreign direct investment accruing to advanced service industries is positive. In order to promote China's development of the service sector, thus, it is necessary to identify the factors influencing the FDI inflow in China's service sector.

For FDI inflow in China's service sector, Feng (2011) proposed that the level of human capital available, R&D capability, open-door policy, and market scale will affect the inflows of FDI in China's service sector. And FDI inflow in the service sector is negatively correlated with labor costs (Yin, 2006). These papers focus more on macroeconomic factors, such as market size, labor cost, and political stability. At the same time, most of the research data was on the factors of FDI inflow in China's service sector before 2010, and there was little research on this aspect in recent years.

However, China has made great efforts to develop advanced technologies and promote a digital economy and has become an increasingly modernized country. E-finance has a greater importance and plays a vital role in developing the economy by improving finance technology and reducing delivery and transaction costs (Srivastava, 2014). Digitalization has transformed business operations by simplifying processes, automating tasks, and improving overall efficiency (Mella, 2012). Fernandes (2009) concluded that service industries that are producers or users of information and communications technology and those that use more intensively skilled labor have higher labor productivity growth than other service industries. Therefore, it is necessary to use the data from recent years and add the modernization factor to predict the influencing factors of FDI inflow in the service sector in China. Some macroeconomic factors are also considered as independent variables in this paper. Future research can further explore the service sector on this basis.

Conceptual Framework

The conceptual framework of this paper is illustrated in Figure 4.

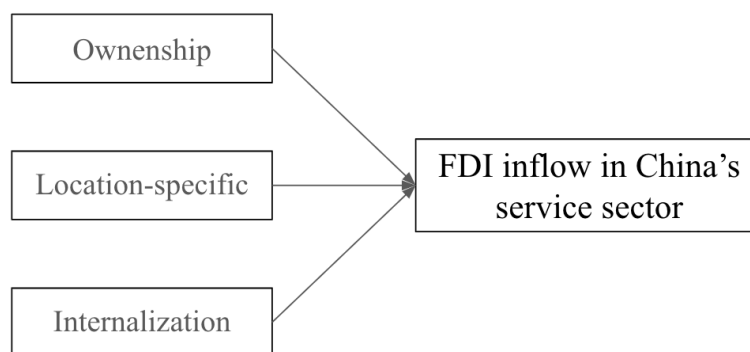


Figure 4. Conceptual Framework

Note: Adopted from Bellak et al. (2008) and Nielsen et al. (2017)

This conceptual framework was developed based on the OLI framework proposed by Dunning (1980). Previous studies such as Bellak et al. (2008) and Nielsen et al. (2017) used this theoretical framework to identify the factors influencing the FDI inflow in their countries. Thus, this theoretical framework can be used for studying the factors influencing the FDI inflow in China's service sector.

Methodology

ARDL Model:

Due to the small sample size of this study which has only 30 sample sizes from 1992 to 2021 annual data, the ARDL model proposed by Pesaran et al. (2001) was chosen for estimating the short-run and long-run relationships. Compared with other econometric models such as VAR and VECM that require large sample sizes, the ARDL model is more suitable for studies with small samples. Small

sample sizes will lead to biased parameter estimates in the model. However, since the most important variable in this paper is the degree of digitalization only in annual data and is difficult to measure. The limited data reflects the availability of the ARDL model. Different variables may have different optimal lags. ADRL model can solve the problems of autocorrelation and endogeneity by using appropriate lagged independent variables (Pesaran & Shin, 1995). Furthermore, the ARDL model performs better than other methods because it can be applied to both non-stationary time series and time series with mixed order of integration (Shrestha & Bhatta, 2018). Based on the study objectives and limited observations, it is a better model to catch the short-run and long-run impact of independent variables on FDI inflow in the service sector in China.

Based on the eclectic paradigm and the previous empirical studies, the theoretical framework of this study was established, and the following equation will be used in this paper.

$$\text{Inflow of FDI in the Service Sector} = f(\text{Market Size, Labor Force, Service Sector Development, Degree of Digitalization}) \quad (1)$$

In order to explain the economic significance of each variable more easily, especially the form of percentage included in the independent variable, this paper will use level-level regression. The multiple linear regression model is presented below:

$$IFDIS_t = \beta_0 + \beta_1(MS_t) + \beta_2(LF_t) + \beta_3(SSD_t) + \beta_4(DOD_t) + \varepsilon_t \quad (2)$$

where t stands for the time over the period 1992 – 2021 in China.

IFDIS = The inflow of FDI in the service sector

MS= Market size

LF = Labor force

SSD = The development of the service sector

DOD = The degree of digitalization

ε = The residual term which is assumed to be normally distributed

Then equation (2) can be written in ARDL form as follow:

$$\begin{aligned} \Delta IFDIS_t = & \alpha_0 + \sum_{i=1}^p \beta_i \Delta IFDIS_{t-i} + \sum_{j=0}^{q1} \chi_j \Delta MS_{t-j} + \sum_{j=0}^{q2} \delta_j \Delta LF_{t-j} + \sum_{j=0}^{q3} \gamma_j \Delta SSD_{t-j} \\ & + \sum_{j=0}^{q4} \omega_j \Delta DOD_{t-j} + \varphi_1 IFDIS_{t-1} + \varphi_2 MS_{t-1} + \varphi_3 LF_{t-1} \\ & + \varphi_4 SSD_{t-1} + \varphi_5 DOD_{t-1} + \varepsilon_t \end{aligned} \quad (3)$$

The first part of the equation with β_i , χ_i , δ_i , γ_i , and ω_i represents the short-run dynamics of the model whereas the parameters φ_1 , φ_2 , φ_3 , φ_4 , and φ_5 represent the long-run relationship.

The first step of this approach is to examine the existence of the long-run relationship. In testing for a long-run relationship between IFDIS and independent variables, we test the null hypothesis that $\varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = \varphi_5 = 0$ which means that there is no long-run relationship and the alternate hypothesis, $H_a: \varphi_1 \neq \varphi_2 \neq \varphi_3 \neq \varphi_4 \neq \varphi_5 \neq 0$ by running bounds test. If there is a long-run relationship, the short-run effect of the independent variables on FDI inflows in China's service sector can be further studied.

Data Collection

This paper adopts a quantitative method to conduct the data analysis for the whole service sector. Due to the limitations of the data, such as the degree of digitalization, which is a new concept, only annual data for the last three decades are available now. However, this variable cannot be ignored, so this paper used secondary data covering the period 1992 to 2021. The data is publicly accessible and sources of each variable mentioned in this paper were shown in Table 1.



Table 1 The Measurement and Sources of Each Variable

Variables	Measurement	Unit	Data Source
IFDIS	The amount of FDI inflow in China's service sector	Billions of CNY	NBS
MS	GDP per capita in constant 2015 prices	Thousand CNY	The World Bank
LF	The unemployment rate of China	Percentage	NBS
SSD	The share of added value of the service sector to GDP	Percentage	NBS
DOD	The penetration rate of the mobile phone	Per 100 people	NBS

H1: Holding other factors constant, market size has impact on the FDI inflow in the service sector in China.

H2: Holding other factors constant, labor force has impact on the FDI inflow in the service sector in China.

H3: Holding other factors constant, service sector development has impact on the FDI inflow in the service sector in China.

H4: Holding other factors constant, the degree of digitalization has impact on the FDI inflow in the service sector in China.

The above examination deals with the factors influencing FDI inflow in the whole service sector in China, while it is also necessary to further understand the impact of these factors on a specific service industry. The wholesale and retail trades industry, the service industry with the highest value-added as a share of GDP, is selected for this study. Especially in the 21st century, e-commerce has played a key role in driving the development of this industry using the Internet. Considering this reason, the wholesale and retail industry is chosen as a specific service industry for further research in this paper. Since there is no data record on FDI inflow in China's wholesale and retail trade industry from 1992 to 1996, this paper uses the research data of 25 years from 1997 to 2021 for this industry. Because there is not enough data to be able to support the analysis of the four independent variables on this dependent variable, this paper excluded this one independent variable which is “service sector development” from this specific industry analysis. The measurement of each variable was shown below.

Table 2 The Measurement and Sources of Each Variable of the Specific Industry

Variables	Measurement	Unit	Data Source
IFDIWR	The amount of FDI inflow in the wholesale and retail trade industry	Billions of USD	NBS
MS	GDP per capita in constant 2015 prices	USD	The World Bank
LF	The unemployment rate of China	Percentage	NBS
DOD	The penetration rate of the mobile phone	Per 100 people	NBS

The hypothesis in this part is consistent with the hypothesis above about how the independent variables will affect FDI inflow in the whole service sector. Also, the small sample size of the study may incur large standard errors and lack of precision. However, studying the degree of digitalization is useful for influencing FDI inflows in modern society.



Results

1. Unit Root Test:

Although the ARDL model can use both the I (0) and I (1) series, in order to avoid higher order such as I (2), this paper still conducts unit root test on each time series to determine whether a variable is non-stationary. The ADF (Augmented Dickey-Fuller) test was proposed by Dickey and Fuller (1979) is one of the common unit root test methods. If a time series has a unit root, it indicates that it is non-stationary, and vice versa. For the series at level that is non-stationary, this paper takes the first difference and tests the unit root again. The findings which include the test statistics, the critical value, the P-value, results, and inference of each variable were shown in Table 3 below.

Table 3 Unit Root Test Results for the Service Sector

Variable	ADF (test statisitcs)	At 5% level	P-value	Result	Inference
IFDIS	5.444642	-1.952910	1.0000	Non-stationary	I (1)
I (1) IFDIS	-5.145847	-3.580622	0.0015	Stationary	
MS	2.096055	-2.967767	0.9998	Non-stationary	I (1)
I (1) MS	-4.004700	-2.971853	0.0047	Stationary	
LF	-2.700156	-2.967767	0.0862	Non-stationary	I (1)
I (1) LF	-5.015280	-3.580622	0.0020	Stationary	
SSD	-2.764899	-3.580622	0.1812	Non-stationary	I (1)
I (1) SSD	-2.980809	-2.971853	0.0491	Stationary	
DOD	-2.133008	-3.622033	0.5017	Non-stationary	I (1)
I (1) DOD	-3.140729	-2.976263	0.0353	Stationary	

As shown in Table 3, the p-value of each original sequence is greater than 0.05, so the sequence of each variable is non-stationary at level. Next, the unit root test is performed on the first difference of each time series, the p-value of each sequence is less than 0.05, which means that all variables is stationary at I (1). Since the ARDL model allows the existence of I (0), I (1) or a mixture of both, these variables can be used in the ARDL model.

Then unit root test for the specific industry were also done. The results were shown in Table 4.

Table 4 Unit Root Test Results for the Wholesale and Retail Trades Industry

Variable	ADF (test statisitcs)	At 5% level	P-value	Result	Inference
IFDIWR	-3.385538	-3.673616	0.0832	Non-stationary	I (1)
I (1) IFDIWR	-3.641039	-2.998064	0.0128	Stationary	
MS	-3.580942	-3.622033	0.0541	Non-stationary	I (1)
I (1) MS	-4.502505	-3.622033	0.0083	Stationary	
LF	-2.227678	-2.991878	0.2023	Non-stationary	I (1)
I (1) LF	-4.264743	-1.956406	0.0002	Stationary	
DOD	-2.808044	-3.658446	0.2104	Non-stationary	I (1)
I (1) DOD	-3.963086	-3.004861	0.0065	Stationary	

The results showed that each variable is non-stationary at level but stationary at I (1). Therefore, these data also can be used in the ARDL model.

2. Cointegration Testing:

Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be cointegrated. Cointegration testing is a necessary step in determining whether a model exhibits a meaningful long-term relationship. Bound cointegration testing technique will be used in this paper. Pesaran et al. (2001) computed two sets of asymptotic critical values for testing cointegration. They are respectively the lower bound critical value, that is I (0), and the upper bound critical value, that is I (1).

As mentioned above, the parameters ϕ_1 , ϕ_2 , ϕ_3 , ϕ_4 , and ϕ_5 represent the long-run relationship in equation (3). The null hypothesis is $\phi_1 = \phi_2 = \phi_3 = \phi_4 = \phi_5 = 0$ which means that there is no long-run relationship, and the alternate hypothesis is $\phi_1 \neq \phi_2 \neq \phi_3 \neq \phi_4 \neq \phi_5 \neq 0$. The existence of the long-run relationship between the variables is tested by computing the Bound F-statistic. If the calculated F-statistic is greater than the upper bound critical value, a long-term relationship exists. If the F-statistic is below the lower bound critical value, the null hypothesis cannot be rejected. If the value is between the lower bound critical value and the upper bound critical value, the result is inconclusive.

Table 5 Bounds Test for Cointegration Relationship (Service Sector)

Test Statistic	Value	K	Significance level	Bound Critical Values	
				I (0)	I (1)
F-statistic	15.96575	4	1%	3.29	4.37
			5%	2.56	3.49
			10%	2.20	3.09

The results of the bounds test for cointegration are reported in Table 5. K=4 represented there has 4 independent variables. The value of F-statistic is 15.96575 which is greater than the upper bound critical value at 5% or even 1% significance level, it indicates that there is a statistically significant long-run relationship between the variables in the model. In other words, the lagged values of the dependent variable and other independent variables, when combined, have a meaningful impact on the current value of the dependent variable.

Then, the bounds test was also done for the wholesale and retail trades industry. The results were shown below.

Table 6 Bounds Test for Cointegration Relationship (Wholesale and Retail Trades Industry)

Test Statistic	Value	K	Significance level	Bound Critical Values	
				I (0)	I (1)
F-statistic	6.105705	3	1%	3.65	4.66
			5%	2.79	3.67
			10%	2.37	3.2

In this table, the value of F-statistic is also greater than the upper bound critical value at 5% significance level, which means that there is a statistically significant long-run relationship between the variables in the model of the specific industry.

Because there is a long-run relationship between the variables of these two models, the ARDL cointegration approach can be further applied.

3. Results for the Service Sector - Long-run Relationship:

Based on the empirical results above, the null hypothesis that there is no long-term relationship can be rejected, the following long-run model is estimated,

$$IFDIS_t = \alpha_1 + \sum_{i=1}^p \beta_{1i} IFDIS_{t-i} + \sum_{j=0}^{q1} \chi_{1j} MS_{t-j} + \sum_{j=0}^{q2} \delta_{1j} LF_{t-j} + \sum_{j=0}^{q3} \gamma_{1j} SSD_{t-j} + \sum_{j=0}^{q4} \omega_{1j} DOD_{t-j} + \varepsilon_{1t} \quad (4)$$

P, q₁, q₂, q₃ and q₄ are the lag order of each variable, respectively. For the lag length selection usually use explicit statistical criteria such as Akaike Information Criterion (AIC), Schwarz's information criterion (SIC) or Hannan-Quin criterion. Liew (2004) indicates that Akaike Information Criterion (AIC) is more appropriate when the observations are less than 60 and Hannan-Quin is more efficient when observations are above 120. Therefore, the order of lags in this ARDL model is selected by the Akaike Information Criterion (AIC). ARDL (4,4,3,2,3) is the optimal lag length in the Top 20 models for this paper as it has the minimum AIC value. Based on this model, the long-run estimation was shown below.

Table 7 Estimated Long Run Coefficients using the ARDL Approach

ARDL (4,4,3,2,3) based on Akaike Information Criterion

Dependent Variable: IFDIS

Variables	Coefficient	Std. Error	t-values	Prob.
Constant	483.2043	48.47318	9.968487	0.0002
MS	8.123422	1.093411	7.429435	0.0007
LF	-102.7870	10.85940	-9.465258	0.0002
SSD	-4.761492	2.243101	-2.122727	0.0872
DOD	3.149756	0.236613	13.31186	0.0000

The results showed that GDP per capita, unemployment rate, and the penetration rate of the mobile phone have significant effects on the inflows of the FDI in the China's service sector at 5% and even 1% significance level. These coefficient signs are consistent to monetary theories.

Specifically, in the long-run, each 1,000 CNY increase in China's GDP per capita will lead to an 8.12 billion CNY increase in the inflows of the FDI in China's service sector. This result showed that the hypothesis that the increase in GDP per capita is expected to increase the amount of FDI inflow in the service sector can be accepted.

In terms of human capital, the unemployment rate has a negative impact on FDI inflows in China's services sector at 5 % significance level. For every 1% increase in unemployment rate, the FDI inflow in services decreases by 102.78 billion CNY. This result is reasonable because a higher unemployment rate is not conducive to healthy social development and affects FDI inflows in China.

For the most important variable, holding other factors constant, a 1% increase in the penetration rate of the mobile phone will lead to a 3.15 billion CNY increase in the FDI inflows in the service sector. This illustrates the significant and positive impact of increased digitization on FDI inflows in the services in the long-run. This could stimulate growth in services such as mobile applications, e-commerce and online service-related areas, hence driving FDI inflows in services.

4. Results for the Service Sector - Short-run Relationship:

The ARDL specification of the short-run dynamics can be derived by constructing an ECM of the following form:

$$\Delta IFDIS_t = \alpha_2 + \sum_{i=1}^p \beta_{2i} \Delta IFDIS_{t-i} + \sum_{j=0}^{q1} \chi_{2j} \Delta MS_{t-j} + \sum_{j=0}^{q2} \delta_{2j} \Delta LF_{t-j} + \sum_{j=0}^{q3} \gamma_{2j} \Delta SSD_{t-j} + \sum_{j=0}^{q4} \omega_{2j} \Delta DOD_{t-j} + \lambda_1 ECM_{t-i} + \varepsilon_{2t} \quad (5)$$

where ECM_{t-i} is the error correction term, define as:

$$ECM_t = IFDIS_t - \alpha_1 - \sum_{i=1}^p \beta_{1i} IFDIS_{t-i} - \sum_{j=0}^{q1} \chi_{1j} MS_{t-j} - \sum_{j=0}^{q2} \delta_{1j} LF_{t-j} - \sum_{j=0}^{q3} \gamma_{1j} SSD_{t-j} - \sum_{j=0}^{q4} \omega_{1j} DOD_{t-j} \quad (6)$$

β_{2i} , χ_{2j} , δ_{2j} , γ_{2j} , and ω_{2j} represent the short-run dynamics of the model and λ_1 represents the speed of adjustment back to long-run equilibrium after a short-run disturbance.

Table 8 Error Correction Representation for the selected ARDL Model

ARDL (4,4,3,2,3) based on Akaike Information Criterion				
Dependent Variable: $\Delta(IFDIS)_t$				
Variables	Coefficient	Std. Error	t-values	Prob.
$\Delta(IFDIS)_{t-1}$	1.757293	0.150310	11.69116	0.0001
$\Delta(IFDIS)_{t-2}$	1.023350	0.122633	8.344797	0.0004
$\Delta(IFDIS)_{t-3}$	0.120434	0.079789	1.509399	0.1916
$\Delta(MS)_t$	11.13500	1.832388	6.076773	0.0017
$\Delta(MS)_{t-1}$	-13.38520	2.650064	-5.050897	0.0039
$\Delta(MS)_{t-2}$	-27.56990	2.701161	-10.20668	0.0002
$\Delta(MS)_{t-3}$	-10.16529	2.016477	-5.041115	0.0040
$\Delta(LF)_t$	-67.52287	11.26347	-5.994853	0.0019
$\Delta(LF)_{t-1}$	172.6635	18.26501	9.453237	0.0002
$\Delta(LF)_{t-2}$	124.6772	17.47840	7.133217	0.0008
$\Delta(SSD)_t$	-15.30170	2.764258	-5.535556	0.0026
$\Delta(SSD)_{t-1}$	-11.39433	3.471425	-3.282322	0.0219
$\Delta(DOD)_t$	4.715068	1.044561	4.513923	0.0063
$\Delta(DOD)_{t-1}$	-5.802845	1.249705	-4.643371	0.0056
$\Delta(DOD)_{t-2}$	-8.493772	1.393288	-6.096205	0.0017
ECM_{t-1}	-2.778936	0.200767	-13.84157	0.0000
R-squared		0.999522	F-statistic	523.2861
Adjusted R ²		0.997612	Prob(F-statistic)	0.000001

The results of the error correction term for the FDI inflow in China's service sector are presented in Table 8. Most of the coefficients in the short-run are strongly significant, except for the lag third order of IFDIS.

From the short-run coefficient estimation results, FDI inflow is positively correlated with the previous inflow of FDI. It also represented that the previous period's FDI inflows will affect the decisions of foreign investors in the current period. Higher profits by investing in the service sector will boost their confidence then continue investing in this sector.

The current period of the FDI inflows will also be affected by other external factors. Each 1,000 CNY increase in China's GDP per capita will lead to 11.135 billion CNY increase in the inflows of the FDI in China's service sector in the short-run, and the positive impact is greater in the short-run than in the long-run. It indicated that the improvement of the national economic level can feed back FDI inflows more quickly in the short-run.

From a human capital perspective, a 1% fall in the unemployment rate raises FDI inflows in the service sector by 67.52 billion CNY. The impact of unemployment on FDI inflows in the short-run is smaller than in the long-run, suggesting that unemployment is detrimental to attracting foreign investment, while this may have a time lag effect on FDI inflows, which means that if employment has problems, the impact on FDI inflows to services will be greater over time.

For the most important variable, a 1% increase in the penetration rate of the mobile phone will lead to a 4.72 billion CNY increase in the FDI inflows in the service sector. The greater impact in the short-run indicated that technological innovations and rapid growth in market demand, create additional investment opportunities for foreign investors. However, as the market becomes saturated and the technology matures, growth may be limited in the long run, thus attenuating the impact of cell phone penetration on FDI, but it is undeniable that digitization has played a driving role in attracting foreign investment.

The estimated coefficient of ECM is negative and significantly verifies that there is a cointegration relationship and that short-run variations have indeed a significant effect on the long-run equilibrium. The empirical results showed that a strong convergence of the model, and any deviation from the short-run between variables and the inflow of FDI in China's service sector can be adjusted and recovered each year at 277.89% in the long-run.

5. Results for the Wholesale and Retail Trades Industry - Long-run Relationship:

Following the above steps, the ARDL model was used in the study of this specific industry as well. Due to the small sample size of this model, too many lag orders may lead to overfitting. After trying a series of lag orders, this paper finally chooses 3 as the maximum lag order for regression by comparing the residuals under different lag orders. Thus, ARDL (2, 3, 3, 3) is the optimal choice for this model as it has the minimized AIC value. Based on this model, the long-run estimation was shown below.

Table 9 Estimated Long Run Coefficients using the ARDL Approach

ARDL (2,3,3,3) based on Akaike Information Criterion

Dependent Variable: IFDIWR

Variables	Coefficient	Std. Error	t-values	Prob.
Constant	18.98579	2.025477	9.373493	0.0000
MS	-0.004196	0.000329	-12.75513	0.0000
LF	-3.641764	0.670326	-5.432821	0.0010
DOD	0.445843	0.027108	16.44716	0.0000

The long-run coefficients show that GDP per capita, unemployment rate, and the penetration rate of the mobile phone have a significant effect on the inflows of the FDI in the wholesale and retail trade industry at 5% significance level.

According to the empirical results, in the long-run, each 1 dollar increase in the GDP per capita will lead to 0.004 billion USD decrease in the FDI inflow in the wholesale and retail trade industry. However, GDP per capita has a positive effect on the FDI inflow in the whole service sector. This may imply that the structure of China's economy is changing over time. Higher GDP per capita may imply that China's economy is moving towards a higher-end and more advanced level, while lower FDI inflows into the wholesale and retail trade industry may indicate that foreign capital is more oriented toward investing in other higher-value-added service industries in the long-run.

The unemployment rate coefficient is negative and it means that a 1% fall in unemployment rate raises FDI inflows in this industry by 3.64 billion USD. The coefficient sign on the unemployment rate and FDI inflows in the wholesale and retail industry is consistent with the sign on the unemployment rate and FDI inflows in the service sector, but the effect is a bit smaller. Compared with other service industries, the wholesale and retail trade industries tend to be more stable as they involve basic consumer goods and daily necessities, and hence unemployment has a relatively small impact on this industry.

For the most important variables, the p-value of the degree of digitalization is less than 1% significance level, so this paper rejects the null hypothesis and concludes that there is sufficient evidence to show that each 1% increase in the penetration of the mobile phone will lead to 0.45 billion USD increase in the FDI inflow in the wholesale and retail industry. Based on the current situation, a large part of the growth in the wholesale and retail industry is dependent on online transactions, such as online shopping, and live e-commerce. This is inseparable from the growth of the Internet, and the penetration of mobile phones has driven consumer shopping, which is a good opportunity for investors to invest and thus introduce FDI.

6. Results for the Wholesale and Retail Trades Industry - Short-run Relationship: The short-run dynamics model estimation was shown below.

Table 10 Error Correction Representation for the selected ARDL Model

ARDL (2,3,3,3) based on Akaike Information Criterion				
Dependent Variable: $\Delta(\text{IFDIWR})_t$				
Variables	Coefficient	Std. Error	t-values	Prob.
$\Delta(\text{IFDIWR})_{t-1}$	0.714378	0.146347	4.881383	0.0018
$\Delta(\text{MS})_t$	-0.005426	0.002303	-2.356270	0.0506
$\Delta(\text{MS})_{t-1}$	0.001034	0.003023	0.341933	0.7424
$\Delta(\text{MS})_{t-2}$	0.009498	0.003485	2.725450	0.0295
$\Delta(\text{LF})_t$	-1.291621	0.943902	-1.368385	0.2135
$\Delta(\text{LF})_{t-1}$	6.996307	1.577442	4.435224	0.0030
$\Delta(\text{LF})_{t-2}$	6.184800	1.659603	3.726674	0.0074
$\Delta(\text{DOD})_t$	0.788646	0.109951	7.172680	0.0002
$\Delta(\text{DOD})_{t-1}$	-1.039695	0.105278	-9.875715	0.0000
$\Delta(\text{DOD})_{t-2}$	-0.886943	0.245959	-3.606065	0.0087
ECM_{t-1}	-2.666562	0.384992	-6.926283	0.0002
R-squared		0.991417	F-statistic	57.75207
Adjusted R ²		0.974250	Prob(F-statistic)	0.000008

It reveals that the main finding remains consistent with what is obtained in the long-run. Most of the coefficients in the short-run are strongly significant, except for the lag first order of GDP per capita and the current period of the unemployment rate.

First of all, FDI inflows in the wholesale and retail trade industry in the previous period positively contributed to FDI inflows in the current period, which indicates the existence of dynamic behavior in the adjustment process. Various adjustment processes may take some time to take effect, so current period FDI inflows into wholesale and retail trade may be influenced by the previous period, and a positive lag effect implies that past FDI inflows have positively influenced economic activity in the current period. This confidence can motivate more foreign investors to invest their capital in the industry in the short run.

For the independent variables, the negative impact of GDP per capita is greater in the short-run than in the long-run but it's significant at 10% significance level. The unemployment rate in the short-run has a negative but insignificant role in FDI inflow in the wholesale and retail industry, suggesting

that the relationship between unemployment and FDI flows into the industry is not stable in the short-run. For the degree of digitalization, each 1% increase in the penetration rate of the mobile phone will increase 0.789 billion USD in the FDI inflow in the wholesale and retail trade industry. The increase in mobile phone penetration reflects the rapid growth of China's digital economy, which means that more people are using their mobile devices for activities such as online shopping and payments. This could attract foreign investors to invest in China's wholesale and retail industry to meet the growing demand for digital consumption, resulting in a positive correlation in the short term. In summary, mobile phone penetration has a positive impact on FDI inflows in the wholesale and retail trade industry in both the short-run and long-run.

The value of the error correction term is negative and statistically significant at 1% level. The coefficient value clarifies that any deviation of the variables from the long-run equilibrium will be corrected and converge to the equilibrium level at 267 % annually.

7. Residuals:

In order to avoid that the reliability of the model setting is doubtful as a result of parameter instability in the end, the residuals of the error correction model in this paper are tested using the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests proposed by Brown et al. (1975) to the residuals of the error-correction model. These tests are based on the recursive residuals and squared recursive residuals, respectively, of the evaluated model and are plotted against break points. If plots of CUSUM or CUSUMSQ statistics stay within critical bounds of 5% significance level, the null hypothesis of the coefficients are stable in the error correction model and cannot be rejected.

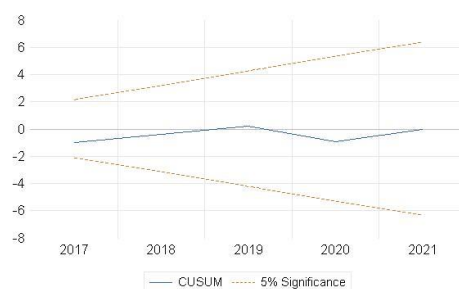


Figure 5. Plot of Cumulative Sum of Recursive Residuals

Note: Constructed by the author

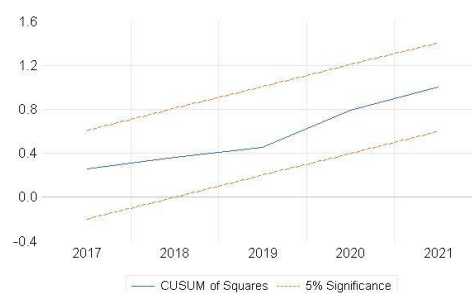


Figure 6. Plot of Cumulative Sum of Squares of Recursive Residuals

Note: Constructed by the author

From the above figures for testing residuals of the whole service sector, it can be seen that the values of both the CUSUM and CUSUMSQ statistics do not deviate from the bound ranges, thus indicating that the coefficients of the constructed ARDL(4, 4, 3, 2, 3) model are stable and the model has a high degree of confidence at 5% significance level.

For the specific industry, this method is also used for testing residuals.

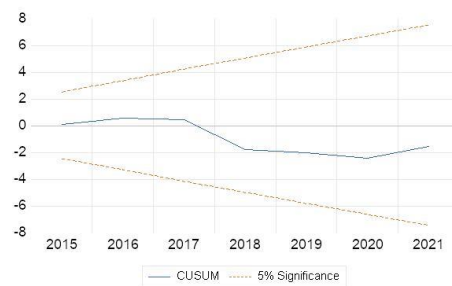


Figure 7. Plot of Cumulative Sum of Recursive Residuals

Note: Constructed by the author

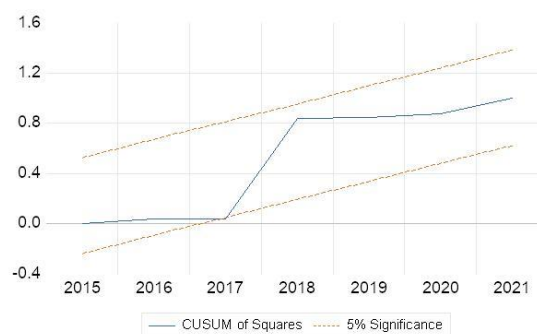


Figure 8. Plot of Cumulative Sum of Squares of Recursive Residuals

Note: Constructed by the author

These two Figures showed that the values of the CUSUM and CUSUMSQ statistics do not deviate from the bound ranges, which indicates that the coefficients of the constructed ARDL(2, 3, 3) model are stable and the model has a high degree of confidence at 5% significance level.

Discussion

This paper considers the effect of each variable from the long-run and short-run. Analyzing these variables by the ARDL approach, the empirical results show that in the long-run and short-run, market size and degree of digitalization have significant and positive impacts on the FDI inflow in the service sector. This finding is consistent with studies by (Kaliappan et al., 2015; Kolstad & Villanger, 2008; Sabir et al., 2019), which also found a positive association between GDP per capita and FDI inflow in services. Also, this finding is somehow consistent with a study by Gani and Sharma (2003) which found that information and communications technology is a determining factor in attracting FDI in high-income countries. This is consistent with this paper's result. At the same time, the paper mentioned that countries that are lagging behind in attracting foreign investment, need to strengthen reforms and emphasize the creation and dissemination of ideas and products, especially in the field of information and communication technology. Thus, China should emphasize development in the field of communications technology. Yousefi (2018) also concluded that the number of Internet users had a positive impact on services exports and imports.

China increased penetration of mobile phones means that more people can use their mobile devices for digital services and online transactions. It will lead to a positive impact on foreign capital inflows. Meanwhile, the unemployment rate and the development of the service sector have a negative impact on the FDI inflow. This is in line with the finding by Nyen and Cheong (2011) which mentioned that employment in services can encourage FDI inflows in the long-run. Moreover, (Rong et al., 2020) mentioned that FDI boosts employment in China. This paper also found that the previous period of FDI inflow in services will positively affect FDI inflow in the current period, it demonstrates that foreign



investors have increased their confidence in the market and has led to a series of resource accumulations that provide a good foundation for future investments.

However, the results of the wholesale and retail trades industry are not consistent with the results of the services. In the long-run and short-run, the degree of digitalization has a positive impact on the FDI inflow in the specific industry, but the GDP per capita and unemployment rate have a negative impact on the FDI inflows. The incompletely consistent results are a reminder of the need to design different policies and approaches to attracting FDI inflows for different industries in the service sector.

However, due to the limited data in this paper, only 30 years of annual data can be found at this time as well as the lack of data for many service industries, which may lead to less precise results in this paper.

Conclusion

Service sector development is an important indicator of the degree of development of the modern economy. Thus, this paper adopted the ARDL model to investigate the determinants of FDI inflow in the service sector in China, for the period 1992 to 2021. The degree of digitalization is the most important factor considered in this paper, the other factors including GDP per capita, unemployment rate and the share of the service sector to GDP. These are key factors that influencing FDI inflow in the service sector in China. Based on these findings, this paper makes the following recommendations.

The first suggestion is to continue to further improve the market economy reform and to reduce the government's direct intervention in resource allocation. For example, the government could liberalize more areas, lower the threshold of market access, promote the reform of State-owned enterprises and encourage more private enterprises to enter the market. Enterprises and individuals can be encouraged to innovate and invest by lowering their taxes. More private capital entering the tertiary industry is conducive to promoting the development of the tertiary industry.

In addition, higher GDP per capita does not mean higher levels of consumption. China has maintained a high economic growth rate in recent years, but social wealth has also been distributed to a small proportion of the people at an ever-faster speed. Uneven distribution has caused the Chinese residents' consumption level not to grow in line with the size of the market. Thus, it is very important to establish a sound social security system and improve the standard of living of the people. The government can increase the coverage of social security, for example, by expanding subsidies for basic old-age pensions, medical care, unemployment, work-related injuries and maternity. The government should also encourage the active participation of social organizations, enterprises and individuals to form a mechanism for social co-governance and work together to maintain the fairness and sustainability of social security.

The rising unemployment rate has a negative impact on FDI flows into the service sector. So how to reduce the unemployment rate is an issue that needs to be considered at present. From an enterprise perspective, in China, small and medium-sized enterprises (SMEs) are the main creators of employment and provide a large number of flexible work opportunities. The government can prompt more job opportunities by supporting the innovation and development of SMEs. In particular, it should encourage the development of high-technology and high value-added industries to increase labor productivity and value. From the perspective of schools, they can offer students more opportunities for career training and skills upgrading on their campuses to meet the changing market demand. By improving their skill level to increase their competitiveness in the labor market. From the market perspective, to develop more flexible labor market policies, including flexible working hour arrangements, reasonable salary systems and incentives to encourage hiring. Increasing the transparency of the labor market and helping job seekers find suitable positions more easily through information platforms and job agency services. This will help safeguard reasonable labor rights, improve the employment environment and promote employment.

In response to modernization development, it is essential to enhance digitalization. This is also the most crucial part of this paper. Digitalization can improve industrial efficiency, reduce costs and enhance market competitiveness, thus attracting more foreign investment. So, the Chinese government and enterprises should jointly invest in digital infrastructure, including high-speed Internet such as 5G, cloud computing and so on. Having a strong digital infrastructure is a basic pre-condition for attracting foreign investment.

Enterprises need to formulate a clear digital strategy and define the direction and goals of the digital industry in order to attract the active participation of foreign investors. The government should also encourage and support enterprises to carry out digital innovation and enhance the added value of their products and services through digital technology. This will help improve the competitiveness of Chinese enterprises in the global market. For example, it should formulate policies to support



digitalization, including tax incentives, financial support, and reducing administrative approvals. It should also encourage upstream and downstream of the industrial chain to form digital collaboration and improve the digitalization level of the whole industry.

With the development of the era, the modernization factor will become more important for capital inflow. This paper provides a solid foundation for research on the development of China's service sector.

Recommendation

From a realistic viewpoint, China is still a developing country, the proportion of tertiary industry also has a large gap with that of developed countries, so it is essential to learn from developed countries' technologies. Research the factors that influencing FDI inflow in the service sector can help China to narrow the gap with developed countries.

Although the purpose of this paper is to study the influencing factors of FDI inflow in China's service sector, due to the limitation of data and the short time of digital development, only 30 years of research data can be collected for research at present, and there are also missing industrial data, so it is impossible to analyze every service industry. Different industries may have different research focus, this may lead to a less in-depth and comprehensive study of FDI inflows into various service industries. Therefore, future researchers can expand the sample coverage and sources of variables to obtain more comprehensive and representative data to analyze the influencing factors of FDI inflow in various industries and put forward different suggestions for stimulating foreign capital inflow in each industry.

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