

The impact of CEPA trade in services agreement on the upgrading of industrial structure in underdeveloped areas of Guangdong Province

Liu Shilin

Guangxi Normal University, Guilin, China

Abstract: *The CEPA Agreement on Trade in Services was officially implemented on 1 June 2016, marking the basic liberalization of trade in services between the Mainland, Hong Kong and Macao. The balanced panel data of 21 prefecture-level cities in Guangdong Province from 2012 to 2019 were selected to evaluate the impact and mechanism of CEPA service trade agreement on the industrial structure upgrading of underdeveloped areas in Guangdong Province by using the double difference method. The results show that: (1) the implementation of the CEPA agreement on trade in services has promoted the upgrading of the industrial structure of underdeveloped areas in Guangdong Province, and this result is still true after the robustness test; (2) The mechanism of action shows that the CEPA agreement on trade in services can promote the upgrading of industrial structure by improving the level of regional innovation.*

Keywords: *CEPA; less developed regions; industrial structure upgrading; regional level of innovation*

1. Introduction

Over the past 20 years of reform and opening up, Hong Kong has been the mainland's most important trading partner, the largest source of foreign investors and a destination for outbound investment. Over the years, economic and trade exchanges and cooperation between the mainland and Hong Kong have reached a high level, and the economic and trade relations between the mainland and Hong Kong are to further develop and face the problem of innovating cooperation mechanisms and methods. Against this background, the Mainland and Hong Kong signed and implemented the Closer Economic Partnership Arrangement (CEPA) on 29 June 2003. On the whole, the implementation of CEPA has promoted the development of Hong Kong's economy, mainly by promoting the development of Hong Kong's manufacturing and service industries.

So what impact will CEPA have on the mainland's manufacturing and service industries? For the manufacturing industry, the basic goal of CEPA is "zero tariff", which means that Hong Kong products will have greater cost competitive advantage, which is of great significance to the development of Hong Kong's manufacturing industry, and the mainland manufacturing industry will face new opportunities and challenges. The mainland's service sector is a weak link in the market, and there is huge room for development compared to the manufacturing industry. Taking Guangdong Province as an example, as a springboard for Hong Kong to enter the mainland, since the implementation of CEPA, the entry of Hong Kong-funded service industry can be described as in full swing, and the service industry in Guangdong Province is replacing the manufacturing industry as a hot spot for Hong Kong enterprises to participate^[1]. Further dividing Guangdong Province into the Pearl River Delta region and the northwestern and eastern regions of Guangdong, the average tertiary industry contribution rate of the Pearl River Delta between 2010 and 2016 was 51.4%. The average contribution rate of the tertiary industry in the northwest and east of Guangdong is only 41.4%, which shows that the added value of the tertiary industry in the northeast and west regions of Guangdong has more room for growth than in the Pearl River Delta region. So will CEPA have an impact on the upgrading of the industrial structure in the northeast and west regions of Guangdong? Based on the above analysis, this paper selects the balance panel data of 21 prefecture-level cities in Guangdong Province from 2012 to 2019, takes the Pearl River Delta region as the control group and the northwestern and northeastern regions of Guangdong as the treatment group, and constructs a double difference model based on the CEPA Agreement on Trade in Services implemented on June 1, 2016, and investigates its impact on the industrial structure upgrading of the northwestern and eastern regions of Guangdong Province.

2. Literature review and research hypotheses

2.1. Literature review

The existing literature mainly studies CEPA from two perspectives: theory and empirical perspectives. At the theoretical level, the academic community has conducted a comprehensive and in-depth analysis and discussion of its implementation effect, existing problems and development direction. Based on static effects and dynamic effects, the study found that CEPA will have a positive impact on all parties and have less negative impact. Li Yuanyuan and Feng Bangyan^[3] start from the research of regional benefits and industry benefits, and find that the implementation of CEPA has brought direct and indirect promotion effects to the economy and Chinese mainland economy of Hong Kong and Macao. During the implementation of CEPA, some scholars also found problems in it, such as the conflict of intellectual property laws between the mainland and Hong Kong and Macao^[4], the market access rules involved in the provisions on trade in services, the financial and logistics industries, and the differences between the mainland legal system and the mainland^[5]. In view of the problems arising in the implementation of CEPA, some scholars also gave relevant suggestions, Mei Ao^[6] pointed out that intellectual property protection is an important task to achieve trade facilitation between Guangdong, Hong Kong and Macao, and gave relevant suggestions from the perspective of legislation and law enforcement. Yu Zhaoxiong and Wang Kun^[7] believe that the following can be achieved in the subsequent stage of CEPA arrangements: first, to lower the entry barrier for Hong Kong's service industry to enter the mainland to practice; The second is to establish a counterpart communication mechanism between governments at all levels in the Mainland and functional departments of the Hong Kong government; The third is to improve relevant laws and regulations. At the empirical level, most of the scholars' research has focused on the impact of CEPA on trade between the mainland and Hong Kong. Studies have shown that the implementation of CEPA is conducive to the economic development of the two places, that is, it has a trade-creating effect^[8], and there are certain gaps in different regions of the mainland^[9]. In addition, some scholars have also evaluated the economic effect of CEPA on Hong Kong, and believe that the implementation of CEPA has promoted the growth of Hong Kong's economy^[10], contributed to the stability of Hong Kong's macroeconomy^[11], and improved Hong Kong's total factor productivity^[12]. It is also important to explore the impact of CEPA implementation on the Mainland. Li Caibo^[13] empirically studied the impact of CEPA on Guangdong's trade in goods by using a gravitational model, and the results showed that CEPA did not have a significant impact on Guangdong's trade in goods, and played a role in promoting service trade and investment. Liu Li and Lin Zhiling^[1] found that the implementation of CEPA has strengthened the dominant position of the secondary industry and manufacturing industry in Guangdong and the Pearl River Delta region. Yu Chi^[14] found through empirical research that Guangdong benefited significantly after the implementation of CEPA, but there was an imbalance in regional benefits.

On the whole, the current research on assessing the economic effects of CEPA is relatively comprehensive, but there are few studies on the impact of CEPA and industrial structure upgrading. Moreover, the existing research on industrial structure upgrading mainly focuses on the provincial level and some economic planning areas, and pays less attention to the industrial structure of underdeveloped areas. It is of great significance to study the upgrading of industrial structure in underdeveloped areas for the coordinated development of regional economy.

2.2. Research hypotheses

Compared with the previous CEPA main agreement and supplementary agreements, the CEPA Agreement on Trade in Services marks the basic liberalization of trade in services between the Mainland and Hong Kong and Macao, which has the characteristics of wider and deeper openness compared with the previous CEPA main agreement and supplementary agreements, and further improves the supporting laws and policies for market access in relevant service industries. As a good legal environment and policy support is an important guarantee for improving the level of regional innovation, this paper studies the mechanism of CEPA in promoting the upgrading of industrial structure in the northeast and west regions of Guangdong from the perspective of regional innovation level. On the whole, the CEPA Agreement on Trade in Services has further strengthened the cooperation in intellectual property protection between the two places, provided policy support for the development of Hong Kong's financial services sector in the Mainland, and provided favorable conditions for regional innovation from the perspectives of external legal environment and financial support.

Because innovation has the characteristics of positive externalities, that is, the new technology or innovation results of one economic entity can be used free of charge by other economic agents, and the beneficiaries do not need to pay the relevant costs. Strengthening IP protection can protect regional IP subjects from infringement, ensure that inventors can benefit from inventions, and promote regional innovation^[15]. Secondly, because innovation activities require huge and long-term R&D investment, and financing difficulties are a common problem faced by enterprises, this fundamentally inhibits enterprise innovation, and also reduces the enthusiasm of enterprise innovation, which in turn leads to a decrease in the level of regional innovation. When the level of intellectual property protection is strengthened, enterprises may be more willing to disclose specific R&D information to external investors, who can better understand the innovation results of enterprises, and then enhance their willingness to invest, thereby alleviating the financing constraints of enterprises to a certain extent. The reduction of R&D financing constraints is conducive to enhancing enterprises' willingness to innovate and increasing R&D investment, thereby promoting corporate innovation^[16]. Generally speaking, strengthening intellectual property protection alleviates the problems of positive externalities and financing constraints of innovation to a certain extent, which is conducive to stimulating the innovation momentum of enterprises and helping to improve regional innovation capabilities.

On the other hand, the scale of intermediary services in the mainland is very different from that of Hong Kong, and the scale of institutions and businesses is relatively small. Therefore, the mainland's service industry, especially the financial industry, will certainly gain greater development opportunities after the implementation of the CEPA agreement on trade in services. Hong Kong's small and medium-sized banks operate flexibly and steadily, and have advantages in small and medium-sized industrial and commercial enterprise loans, general trade finance and other businesses, and their scientific and rigorous operation and management will provide useful reference for mainland commercial banks. As one of the important manifestations of financial support, credit of financial institutions directly affects the credit financing of enterprises. The research on financial support and regional innovation has achieved certain results, and the results show that a sound financial support system can effectively solve the problem of enterprise financing difficulties, which is a strategic measure to resolve and avoid innovation risks and improve independent innovation capabilities^[17]; Bai Ling and Jiang Lei^[18] empirically found with the Dubin model of the spatial panel that regional innovation also depends on the support of the financial system.

Studies have shown that the level of regional innovation is positively correlated with industrial structure upgrading^{[19][20]}. Zhou Xia et al. ^[15] believe that regional innovation plays a catalytic role in the process of industrial upgrading, and the industrial structure is developing in the direction of advanced to adapt to changes in production and consumption structure. Yang Li et al. ^[21] believe that scientific and technological innovation itself exists in industries with relatively mature technology, and the financial support system can promote industrial structure upgrading by encouraging and stimulating the development of the industrial chain to the high-end direction. In summary, the CEPA Agreement on Trade in Services provides opportunities for innovation in the mainland region from the perspectives of strengthening intellectual property protection and improving financial support, guiding the development of the industrial structure in the direction of premiumization, and then promoting the upgrading of the industrial structure. Compared with the Pearl River Delta region, the industrial structure upgrading level of the underdeveloped areas of Guangdong Province has a certain degree of synergy on the whole^[22], but the industrial structure upgrading of the northwestern and northeastern regions of Guangdong still has greater room for improvement, and the industrial upgrading effect brought by the CEPA service trade agreement to the northwestern and northeastern regions of Guangdong is more obvious. Based on the above analysis, this paper proposes the following two hypotheses:

H1: The CEPA agreement on trade in services has promoted the upgrading of the industrial structure in the northwestern and eastern regions of Guangdong

H2: The CEPA Agreement on Trade in Services can promote the upgrading of the industrial structure in the northwestern and eastern regions of Guangdong by enhancing the level of regional innovation

3. Empirical design

3.1. Description of variable selection

The interpreted variable industrial structure upgrading (IND), combined with the connotation of industrial structure and the basic trend of current economic development, industrial structure upgrading is manifested as the process of transfer from the primary and secondary industries to the tertiary industry. Therefore, drawing on the research of Fang Huli et al. [23], this paper measures industrial structure upgrading by measuring the weighted sum of the proportion of the three industrial values to the total output value, and the specific calculation method is as follows:

$$\text{ind} = \sum i \times s_i = 1 \times s_1 + 2 \times s_2 + 3 \times s_3$$

Among them, s_i represents the share of the i th industry in GDP.

Based on previous literature studies, five control variables are introduced. (1) the level of economic development (ECO), measured by the natural logarithm of regional GDP per capita; (2) the level of government financial support (gov), measured as the proportion of general government public expenditure to GDP; (3) the level of financial development (FIN), measured by the natural logarithm of the loan balance of the financial institution at the end of the year; (4) The level of openness (FDI), measured by the natural logarithm of the amount of foreign capital actually utilized; (5) The level of social consumption (SOC), measured by the proportion of total retail sales of consumer goods to regional GDP.

3.2. Model setting

In order to study the impact of the implementation of CEPA on the industrial structure upgrading of northwestern and eastern regions of Guangdong, this paper adopts a double difference model as the benchmark regression model for evaluation, and divides 21 prefecture-level cities in the sample into treatment group and control group, of which the treatment group is northwestern Guangdong and the control group is the Pearl River Delta region. Therefore, this topic sets the group variable TREAT, the processing group is assigned to 1, and the control group is assigned to 0. Since the CEPA Agreement on Trade in Services was officially implemented on June 1, 2016, this paper takes 2016 as after policy implementation, 2016 and previous years as before policy implementation, and generates policy implementation variable time, with a value of 0 before policy implementation and 1 after policy implementation. Based on this, the following empirical model is constructed.

$$\text{ind}_{it} = \beta_0 + \beta_1 \text{treat} \times \text{time} + \beta_c Z_{it} + \lambda_t + \mu_i + \varepsilon_{it}$$

Among them, ind_{it} indicates the level of industrial structure upgrading in the t period, $\text{treat} \times \text{time}$ is the core explanatory variable, and the coefficient β_1 that this paper focuses on is used to reflect the policy effect. Z_{it} represents a matrix of other economic characteristics that may affect the upgrading of industrial structure. λ_t and μ_i represent time-fixed effects and individual fixed effects, respectively, and ε_{it} represents random interference terms.

3.3. Data sources and descriptive statistics

Table 1: Descriptive statistics for variables

variables	N	mean	sd	min	median	max
ind	168	2.3555	0.1265	2.12	2.3407	2.7054
eco	168	10.8559	0.662	9.7657	10.66	12.5793
gov	168	0.1631	0.0706	0.0697	0.1433	0.3921
fin	168	0.8739	0.3974	0.2949	0.8014	2.0796
fdi	168	10.4179	1.6812	7.4265	9.9233	13.5683
soc	168	0.4536	0.1137	0.2547	0.4485	0.7281

4. Empirical analysis

4.1. Benchmark regression

Table 2 shows the regression results of CEPA Trade in Services Agreement and industrial structure upgrading in the northeast and west regions of Guangdong, of which (1) is listed as the regression results of uncontrolled individuals and time fixed effects, the results show that the CEPA service trade agreement is significantly positively correlated with industrial structure upgrading, indicating that the implementation of CEPA service trade agreement can promote the upgrading of industrial structure in northeast and west Guangdong. (2) (3) is listed as the regression result of the gradual addition of individual and temporal fixed effects, in which the coefficient of interaction terms decreases after full control of the temporal and individual fixed effects, but is still significantly positive at the 5% level. The above results show that the PRD region has benefited from its geographical location and the establishment of the Guangdong-Hong Kong-Macao Greater Bay Area, and with the advantages of CEPA, after long-term development, the performance of industrial structure upgrading has reached a certain height. Therefore, the CEPA service trade agreement implemented in 2016 has little impact on the Pearl River Delta, while the industrial structure upgrading performance in the northeast and west regions of Guangdong has been poor for many years, which also shows that its upside is large, and the implementation of the CEPA service trade agreement can promote the upgrading of the industrial structure in the northeast and west regions of Guangdong to a certain extent.

Table 2: Benchmark Regression

variables	(1) ind	(2) ind	(3) ind
treat×time	0.056*** (3.11)	0.058*** (5.01)	0.047** (2.58)
eco	0.112*** (4.29)	0.029** (2.35)	0.018* (1.76)
gov	0.055 (0.30)	0.370*** (3.37)	0.230 (1.45)
fdi	0.023* (1.81)	-0.004 (-0.46)	0.001 (0.10)
fin	0.065 (1.44)	0.035** (2.22)	0.014 (0.92)
soc	0.263** (2.28)	0.074 (1.11)	0.060 (0.89)
Observations	168	168	168
R-squared	0.733	0.660	0.689
individual	NO	YES	YES
Year	NO	NO	YES
Note: *, **, **** indicate that they are significant at the level of 1%, 5%, and 10%, respectively, and the T value in parentheses, the same below			

4.2. Parallel trend testing

In order to further ensure the robustness of the double difference model, this paper uses the event study method to test the parallel trend again. Referring to the practice of Zhou Zejiang et al. [24], the interaction terms of the year dummy variable and the treatment group dummy variable are first generated, and these interaction terms are regressed as explanatory variables. The coefficient of the interaction item reflects the difference between the treatment group and the control group in a specific year, and if the coefficient of the interaction item of the dummy variable before the policy time point and the dummy variable of the treatment group is not significant, it indicates that the parallel trend test is passed. However, due to the problem of collinearity, this paper selects 2016 as the base period, and in order to ensure the balance of the years before and after the implementation of the policy, this paper selects samples from 2013 to 2019 for analysis. From the test results in column (1) and (2) of Table 3, it can be seen that there was no significant difference between the treatment group and the control group in the level of industrial structure upgrading (treat_pre4, treat_pre3, and treat_pre2 were not significant), which further shows that the double difference test in this paper meets the model requirements of parallel trend.

Table 3: Parallel trend tests

variables	(1) ind	(2) ind
treat×time	0.046*** (2.96)	0.048*** (2.88)
treat_pre4	-0.017 (-1.55)	0.002 (0.11)
treat_pre3	-0.001 (-0.15)	-0.005 (-0.36)
treat_pre2	0.002 (0.42)	-0.001 (-0.14)
Observations	147	147
R-squared	0.648	0.666
Control variables	NO	YES
individual	YES	YES
Year	YES	YES

4.3. Robustness test

4.3.1. Replace the explanatory variable

This paper refers to the practice of Gan Chunhui et al. [25], measures industrial structure upgrading by the ratio of regional tertiary industry output value to secondary industry output value, and re-examines the impact of CEPA on industrial structure upgrading, and the results are shown in Table 4. It can be seen from Table 4 that the coefficient of the interaction term is 0.194, and the regression results are still significant at the 5% level, which is not significantly different from the previous conclusion, indicating that the previous empirical conclusion is stable.

Table 4: Replace the explanatory variable regression results

variables	ind
treat×time	0.194** (2.47)
Observations	168
R-squared	0.676
Control variables	YES
individual	YES
Year	YES

4.3.2. Placebo test

Drawing on the practices of Li Jiangtao and Tao Siyuan [26], this paper assumes that the policy implementation years are 2013, 2014 and 2015, respectively, and deletes the samples after the implementation of the policy in 2016 (that is, the data from 2012 to 2016 are retained), and performs double differential regression on the basis of the remaining samples, and the regression results are shown in Table 5. Among them, the interaction coefficients in column (1), (2) and (3) were not significant, indicating that the empirical conclusion above is stable, and the CEPA agreement on trade in services implemented in 2016 has indeed had a certain impact on the upgrading of the industrial structure in the northwestern and eastern regions of Guangdong.

Table 5: Placebo test results

variables	2013(1) ind	2014(2) ind	2015(3) ind
treat×time	0.013 (1.68)	0.012 (1.15)	0.005 (0.61)
Observations	105	105	105
R-squared	0.725	0.723	0.714
Control variables	YES	YES	YES
individual	YES	YES	YES
Year	YES	YES	YES

4.4. Mechanism test

The previous conclusion shows that the CEPA agreement on trade in services has promoted the upgrading of the industrial structure in the northwestern and eastern regions of Guangdong, and this part examines its mechanism. This paper believes that the improvement of regional innovation level may be the role path of CEPA Agreement on Trade in Services to promote the upgrading of industrial structure in the northwestern and eastern regions of Guangdong, and the specific inspection steps are as follows: firstly, the regional innovation level (patent) of the intermediary variable is measured, and the research of Zhang Acheng et al. [27] is drawn on, and the ratio of utility model patents authorized to the total number of patents authorized is selected to be expressed; Secondly, drawing on the practice of Xie Fang [28], the regional innovation level was grouped according to the median, divided into two sub-samples with higher and lower regional innovation level, and group regression was carried out. The regression results are shown in Table 6, which shows that the interaction term coefficients are significantly positive in regions with low innovation levels and not in regions with high innovation levels. Therefore, improving the level of regional innovation may be a channel for the CEPA Agreement on Trade in Services to promote the upgrading of the industrial structure in the northeast and west regions of Guangdong.

Table 6: Mechanism tests

variables	The level of innovation is low(1) ind	The level of innovation is high(2) ind
treat×time	0.061** (2.84)	0.024 (1.32)
Observations	80	88
R-squared	0.776	0.580
Control variables	YES	YES
individual	YES	YES
Year	YES	YES

5. Conclusions

Using the sample data of 21 prefecture-level cities in Guangdong Province from 2012 to 2019, this paper constructs a double difference model to empirically analyze the impact of CEPA on the industrial structure upgrading of northwestern and northeastern regions of Guangdong, and tests its impact path. The results show that the implementation of the CEPA agreement on trade in services has promoted the upgrading of the industrial structure in the northwestern and northeastern regions of Guangdong, and can promote the upgrading of the regional industrial structure by improving the level of regional innovation. Based on the conclusions of this paper, the following suggestions are put forward:

First, in the subsequent CEPA arrangement, it is necessary to further promote the legal integration with the service industry of Hong Kong and Macao. At present, there are still problems in service trade, such as professional qualification certification, conflicts of laws and regulations, and insufficient cooperation in intellectual property protection. In particular, further strengthening cooperation in intellectual property protection and promoting the improvement of regional innovation capabilities is still the only way to achieve industrial structure upgrading.

Second, further strengthen the mainland's openness to Hong Kong's financial services industry. As an international financial centre, Hong Kong's financial services industry has always been one of the most important economic pillars. Improve the mainland's financial support system, lay the foundation for upgrading the level of regional innovation, and further promote the upgrading of the regional industrial structure.

Third, establish and improve policies and regulations on regional coordination to promote industrial structure upgrading. The government can give certain economic resources to the underdeveloped areas of Guangdong Province or introduce relevant policies to do a good job in industrial planning in the underdeveloped areas, so as to achieve the purpose of promoting the upgrading of the regional industrial structure. At the same time, industrial cooperation between the northwestern and northwestern regions of Guangdong and the Pearl River Delta region should be further strengthened, and the ability to coordinate the utilization and sharing of resources and elements should be improved.

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