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Trade Liberalization and Regional Wage Dynamics: Evidence from China's WTO Accession

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Abstract: This paper aims to make an in-depth and systematic study on the relationship between international trade and labor force handholding length. The research purposes mainly include the following aspects: First of all, this paper deeply summarizes and discusses various impact mechanisms of international trade on the labor market, laying a corresponding theoretical foundation for empirical research. Secondly, this paper constructs an econometric model of the impact of trade liberalization on the labor market, and uses China's trade, labor and other relevant data to quantify the impact of different technologies on the labor force in China's industrial industries. This paper focuses on the challenges existing in China's economic development, studies and discusses how the regional labor market is affected by the impact of trade liberalization from a dynamic perspective, as well as the differences in the impact in different regions. Finally, relevant policy suggestions are put forward for China's overall trade strategy choice, China's labor market development policy.

Keywords: Trade liberalization, Regional wage dynamics, WTO, Import tariff reduction.

1. Introduction

With the establishment of the World Trade Organization (WTO), trade liberalization has become the general trend of global economic development, which has caused a profound impact on the global economic development. Especially after China's accession to the WTO, China's import tariff has dropped sharply, from 18% to 10% in 2001 to 2006. Accession to WTO has brought profound and complex impact on China's economy. It has boosted productivity, economic growth and consumer welfare, bringing about China's "growth miracle". Up to now, in the complex global political and economic environment, our country still unswervingly adhere to the opening up.

The rapid development of China's foreign trade has injected strong power into the economic development of our country. However, although a country's trade liberalization can improve social welfare at the overall level, the process is often accompanied by internal labor market adjustment and income redistribution. As a typical country with abundant labor resources, the trade of labor-intensive products occupies a large share in China's import and export. China's regional income gap is huge, the cross-regional mobility of labor is restricted by the household registration policy, and the industrial structure has obvious regional characteristics. These national conditions mean that the effect of the regional labor market dimension may be particularly obvious in China (Dai, 2020)[1]. Under the impact of trade liberalization, regional development is unbalanced, the gap between the rich and the poor is widening, and people's livelihood problems such as the difficulty of finding employment for rural labor are rapidly becoming prominent.

After China's accession to WTO, its foreign trade developed rapidly. In the first five years after China's accession to WTO, China actively fulfilled its WTO accession commitments, and made significant reductions in tariff and non-tariff barriers, which were implemented on January 1, 2006 at the latest. During this period, our average tariff level decreased from 15 percent to 8 percent. The gap between the actual applicable tariff rate and the bound tariff rate is small, which increases the predictability of trade policy: non-tariff barriers such as import licenses and import quotas are eliminated, and new systems such as tariff rate quotas are replaced (Zhou&He, 2014)[2]. Since the average tariff rate implemented in China has not decreased significantly since 2006, and no significant progress has been made in the process of trade liberalization (Dai, 2013)[3], this paper mainly chooses the period from 2001 to 2006 as the main research period.

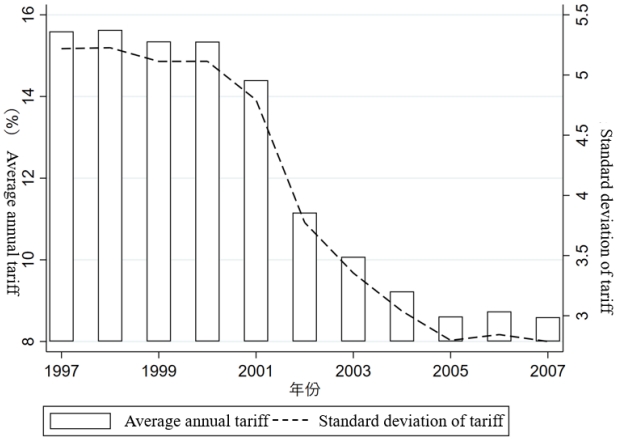


Figure 1. China's annual average tariff rate and standard deviation from

It can be seen from the figure above that after 1997, the average urban tariff level in China has been in a relatively stable state until 2002, when it began to be significantly reduced. From 15.3% in 2000 to 2.8% in 2007. In addition, before China's accession to the WTO, there were large differences in the tariff levels of different industries. It has remained at a low level since 2005.

Manufactured goods constitute the vast majority of international trade in goods. This paper lists the average tariff changes of various industries in China from 2001 to 2006. Tariff level accurately reflects the protection degree of producers in each industry, while tariff changes reflect the impact level of trade liberalization experienced by each industry. The degree of trade liberalization in various industries also shows great differences. In the process of China's trade liberalization, the beverage manufacturing industry, furniture manufacturing industry and tobacco manufacturing industry are the three industries that are most impacted, while the metal smelting and mining industry is less impacted.

In the relevant literature on trade liberalization and regional labor market, the mainstream literature examines the regional effect of trade liberalization by comparing the changes of labor market wages in regions facing different degrees of tariff reduction shocks. In general, wages in a region fall more if its major industries face larger tariff cuts. According to this idea, this paper mainly uses Regional Tariff Changes (RTC), an indicator of trade liberalization from the perspective of labor economics, to measure the degree of regional trade liberalization.

After China's accession to the WTO, China pledged to reduce the differences in tariff barriers across industries. To this end, the tariff cuts during 2001-2006 exhibit a distinct feature: the higher the initial tariff, the larger the tariff reduction. The specific correlation is shown in the figure:

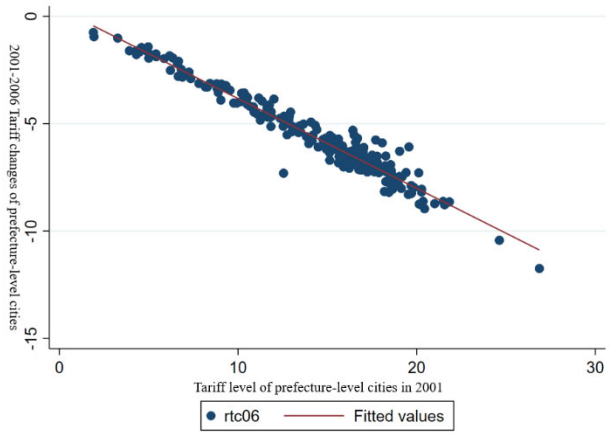


Figure 2. Line graph of tariff concessions and 2001 tariff reduction from 2001 to 2006

It can be seen that there is a clear negative correlation between the tariff changes of each city from 2001 to 2006 and its initial tariff level in 2001. China's initial tariff level also reflects the tariff structure in the early years, and the degree of tariff concessions in various industries in China has a strong correlation with its initial tariff level, which indicates that the change of China's industrial tariff level is not endogenously affected by political and other factors.

2. Data and Empirical Approach

2.1. Data

The data used in this paper consists of three parts. The first is the World Integrated Trade Solution (WITS) database provided by the World Bank, which provides tariff data for products under 6-digit HS codes. The second is the data of China Industrial Enterprise Database in 2001. The third is the data from China City Statistical Yearbook, which provides the average salary and the number of employed workers at the prefecture level from 2001 to 2015. Fourthly, the industrial import and export data in the database of China Research .

Since the HS codes used in different years in the WITS database are different, the HS codes of different years are first unified to the HS2002 version according to the United Nations tariff Code comparison table. Then, according to the United Nations Product classification HS2002 and SITC comparison table, HS code products are classified into SITC categories. The average of product tariffs included in each SITC category was calculated as the industry average tariff level. Finally, the average tariff level of final goods in 28 industries from 2001 to 2006 is calculated. Further using the 2002 China input-output table, the calculation of industrial intermediate tariffs.

China Industrial Enterprise Database contains all soEs in China's industrial sector and non-soes with annual sales of more than 5 million, whose output value exceeds 90% of China's total industrial output value. In this paper, the data of employment in various industries at the city level are obtained by summing up the codes of provinces and counties corresponding to the companies and the classification of industry categories from the survey data of industrial enterprises above designated size in 2001, and the proportion of the population in each industry in the total employment is calculated as the weight of each industry in the trade liberalization index. Furthermore, this paper sums up the export delivery value data of companies in various industries in the database to obtain the export trade volume of each industry.

This paper uses the average wage of employees from 2001 to 2015 in China Urban Statistical Yearbook as the main explained variable. In addition, this paper uses the import and export trade volume of various industries of 31 provinces, municipalities and autonomous regions in the foreign trade plate of the macroeconomic database of China Research Network from 2001 to 2021 to calculate the regional industrial RCA.

2.2. Empirical Approach

This paper refers to the practice of Dai et al. (2020)[1], uses the tariffs of all mineral products and manufactured products of China Customs from 2001 to 2006, and combines the employment data of urban industries from the survey data of industrial enterprises in 2001 to establish the trade liberalization index at the city level (RTC). In addition, according to Kovak (2013)[4], the calculation of this indicator only includes the employees in the tradable sector.

$$RTC_c = \sum_i \beta_{ic,2001} \left(\text{Tariff}_{i,2006} - \text{Tariff}_{i,2001}\right) \qquad (1)$$

Where is the weight of employed persons in industry i of

city c in 2001, specifically defined as follows:

$$\beta_{ic,2001} = \frac{L_{ic,2001}}{\sum_i L_{ic,2001}} \quad (2)$$

c represents the city, i represents the industry, L_{ic}represents the employees in industry i in city c, and Tariff represents the tariff level in year t. The number of employees in industries at the city level in 2001 used in the index is from the survey data of industrial enterprises, while the industrial tariffs are from the database of China Customs. At the same time, since this paper mainly studies the wage changes in the urban labor market related to trade liberalization, this paper uses the tariff changes data of all mineral products and manufactured products.

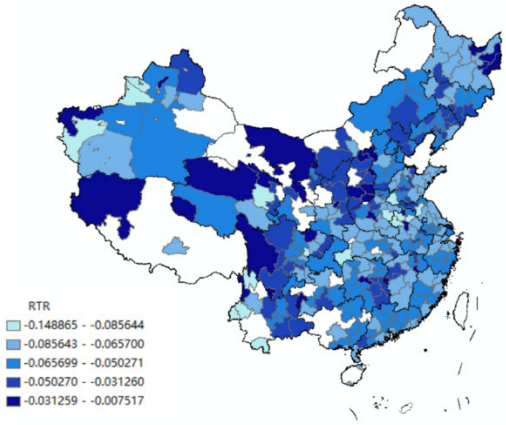


Figure 3. Spatial distribution of the degree of tariff change in prefecture-level cities from 2001 to 2006

In order to test the dynamic impact of trade liberalization on labor wages at the city level, this paper draws on the practice of Dix-Carneiro et al (2017)[5] to establish the following benchmark model and conduct OLS regression:

$$ln(wage_{ct}) - ln(wage_{c,2001}) = \theta_t RTC_c + \alpha_{pt} + \varepsilon_{ct} \quad (3)$$

Where is the key explanatory variable of the model: the indicator of trade liberalization at the city level. Referring to Dix-Carneiro and Kovak(2019)[6] , Autor et al.,(2013)[7] we regard the event of China's accession to the WTO and the reduction of tariff barriers as an instantaneous exogenous shock, and the main trade liberalization stage from 2001 to 2006 as an instantaneous and permanent trade liberalization shock. $wage_{ct}$represents the wage of urban labor in year t, city c. The time range t of wage income in this model is from 2001 to 2015. Represents the province fixed effect. The coefficients of the key explanatory variables represent the cumulative impact of trade liberalization on changes in labor wages at the city level Arias et al.,(2013)[8] ,Bastos& Santos(2022)[9].

3. Results and Discussion

3.1. Overall structure design of the intelligent workshop product

The following table reports the dynamic regression results of the impact of trade liberalization on urban average wages, which are all estimated by OLS. Columns (7) - (9) further control the wage level in the initial year 2001 to control the forward trend of wages. The following figure reports the scatter plot of regression coefficients of city-level wage level on import tariff concessions and the corresponding confidence intervals. The regression coefficient reflects the cumulative impact of import tariff concessions on urban wage levels.

It can be seen from the table that the influence coefficient of regional trade liberalization on urban wage level is positive at the significance level of 1% in the short term, medium term and long term. This shows that the reduction of regional tariffs will reduce the regional average wage growth rate, which is consistent with the conclusion drawn in the theoretical analysis: the reduction of import tariffs will intensify import competition, cause a negative impact on local enterprises, and then reduce the relative wage level of the region.

Table 1. Benchmark regression results

	(1) 2001-2005	(2) 2001-2010	(3) 2001-2015	(4) 2001-2005	(5) 2001-2010	(6) 2001-2015	(7) 2001-2005	(8) 2001-2010	(9) 2001-2015
rtc06	0.020***	0.019***	-0.004	0.018***	0.007	-0.017***	0.019***	0.012***	-0.009***
	(0.000)	(0.001)	(0.451)	(0.000)	(0.142)	(0.001)	(0.000)	(0.003)	(0.007)
wage01							-0.000***	-0.000***	-0.000***
							(0.008)	(0.000)	(0.000)
_cons	0.611***	1.320***	1.729***	0.642***	1.367***	1.720***	0.715***	1.638***	2.148***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Province FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	260	260	258	260	260	258	260	260	258
R^2	0.098	0.038	-0.002	0.365	0.533	0.423	0.381	0.645	0.742

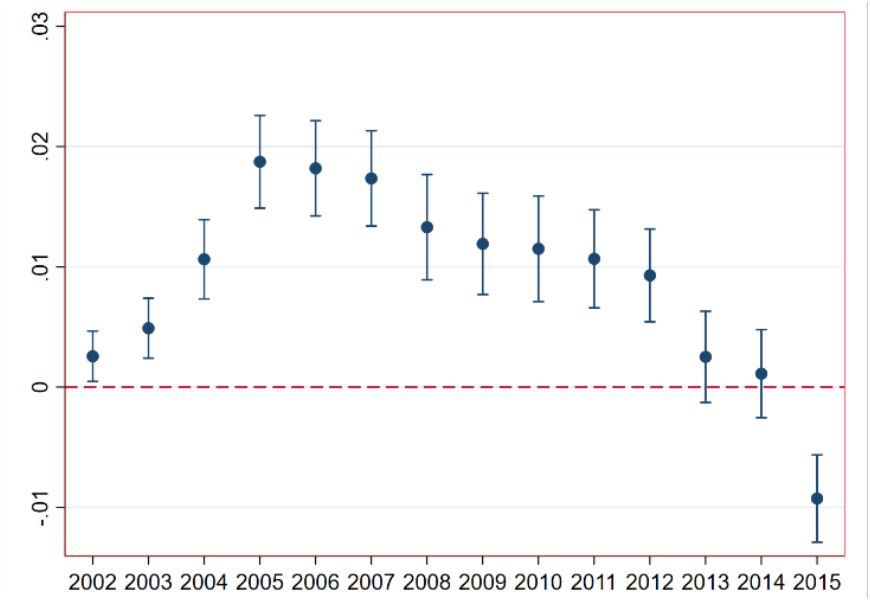


Figure 4. Dynamic corresponding graph of benchmark regression results

The dynamic effect of tariff cuts on regional wage changes is shown in the top panel, which suggests that regional tariff cuts will lead to slower wage growth. From the perspective of dynamic effects, the impact of regional tariff cuts on wages strengthened in the early years, reached the maximum in 2005, and then gradually weakened over time, and this impact lasted until 2012. The coefficient for 2005 indicates that an additional 10 percentage point decrease in tariffs leads to a 0.19 percent relative decline in average urban wages.

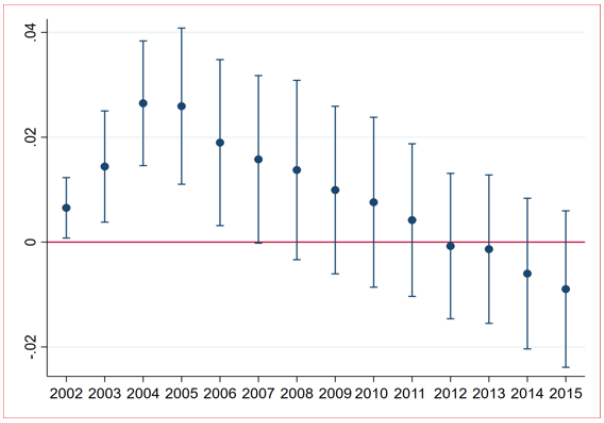
In order to explore the different impacts of trade liberalization shocks on different regions, according to the national economic region division method, this paper classifies all cities into four parts: the eastern region, the central region, the western region and the northeastern region, and conducts regression respectively.

Table 2. Table of regression results for the eastern region and the central region

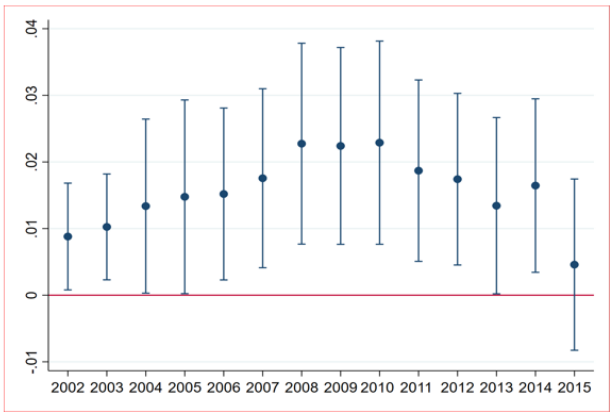
	(1)	(2)	(3)	(4)	(5)	(6)
		eastern			central	
	2001-2005	2001-2010	2001-2015	2001-2005	2001-2010	2001-2015
rtc06	0.026***	0.008	-0.009	0.021***	0.014	-0.017***
	(0.001)	(0.353)	(0.235)	(0.002)	(0.122)	(0.006)
wage01	-0.000***	-0.000***	-0.000***	-0.000	-0.000***	-0.000***
	(0.004)	(0.000)	(0.000)	(0.861)	(0.001)	(0.000)
_cons	0.761***	1.591***	2.119***	0.720***	1.797***	2.276***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
N	83	83	83	80	80	79
R^2	0.412	0.763	0.818	0.520	0.536	0.700

Table 3. Table of regression results of western region and northeast region

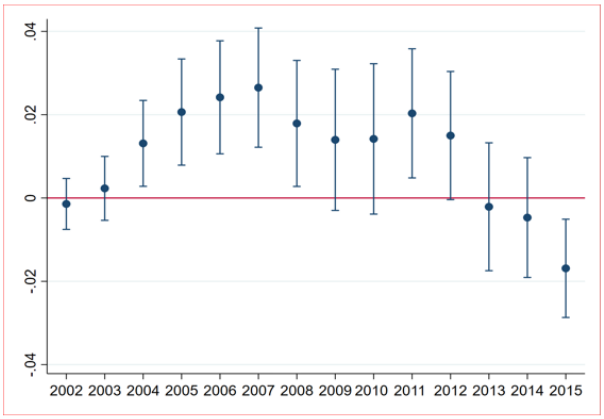
	(7)	(8)	(9)	(10)	(11)	(12)
		western			northeast	
	2001-2005	2001-2010	2001-2015	2001-2005	2001-2010	2001-2015
rtc06	0.015**	0.023***	0.005	0.016	0.004	-0.012
	(0.047)	(0.004)	(0.477)	(0.106)	(0.641)	(0.156)
wage01	0.000	-0.000***	-0.000***	-0.000*	-0.000**	-0.000***
	(0.654)	(0.004)	(0.000)	(0.084)	(0.014)	(0.000)
_cons	0.654***	1.861***	2.399***	0.773***	1.478***	1.994***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
N	63	63	63	34	34	33
R^2	0.197	0.595	0.613	0.043	0.096	0.586



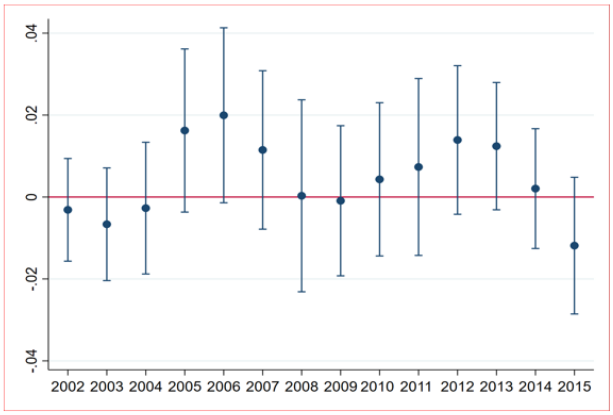
The Eastern region of China



The Central Region of China



The western region of China



Northeast China

Figure 5. Dynamic corresponding graph of regression results by region

In order to test the robustness of the model, this paper uses the tariff level in the initial year as the instrumental variable for robustness test. At the same time, the tariff level in 2001 will not be affected by wage movements during the period of trade liberalization. Therefore, the tariff level of each city in the initial year of trade liberalization is a good instrumental variable for the amount of tariff reduction of each city. The tariff level of each city in the initial year of trade liberalization (2001) is used as the instrumental variable of the key explanatory variable RTC, and the two-stage least squares method is used for estimation to avoid the endogeneity of the lobbying of domestic political groups by regions with slower wage growth (Topalova, 2010)[10].

It can be seen from the analysis chart of instrumental variable regression that the regression result is still significant and almost the same as the regression coefficient in the benchmark regression, which indicates that the benchmark regression is robust.

Table 4. Table of instrumental variable regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	2001-2005	2001-2010	2001-2015	2001-2005	2001-2010	2001-2015	2001-2005	2001-2010	2001-2015
rtc06	0.021***	0.024***	0.000	0.018***	0.008	-0.017***	0.020***	0.013***	-0.009**
	(0.000)	(0.001)	(0.975)	(0.000)	(0.164)	(0.001)	(0.000)	(0.007)	(0.015)
wage2001							-0.000***	-0.000***	-0.000***
							(0.006)	(0.000)	(0.000)
_cons	0.620***	1.350***	1.753***	0.643***	1.374***	1.724***	0.717***	1.646***	2.151***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Province FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	260	260	258	260	260	258	260	260	258
adj. R^2	0.097	0.035	.	0.365	0.533	0.423	0.381	0.645	0.742

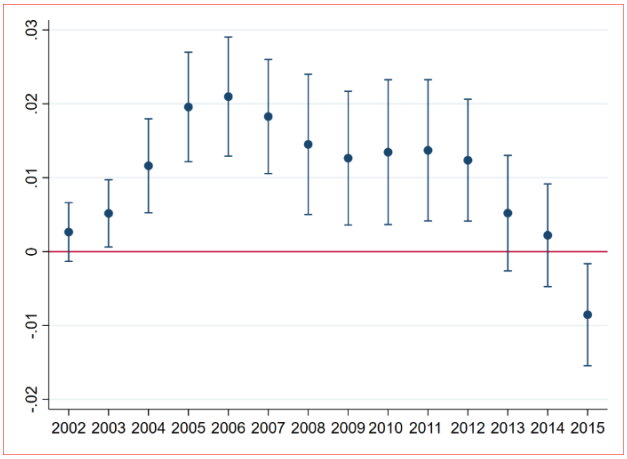


Figure 6. Dynamic corresponding graph of instrumental variable regression results

As can be seen from the above regression results and the regression dynamic graph, the results of the regression using instrumental variables are still significant, which indicates that the benchmark regression is robust.

export control: In order to control the impact of China's export growth on regional wages after its entry into WTO, this paper refers to the method of David et al. (2013) [3]to construct regional export shock (RES). Specifically, the indicator is the weighted average of the growth of the per capita export value of different industries, and the weight is the employment share of the industry in a certain region. The formula is:

$$RES_{ct} = \sum_i \frac{L_{ci2001}}{L_{c2001}} \frac{\Delta X_{it}}{L_{i2001}} \quad (4)$$

Where ΔX_{it} represents the export change of industry i from 2001 to 2006, and L_{ci2001}, L_{c2001} and L_{i2001} represent the labor force of industry i in city c and industry c and i in 2001, respectively. The export data at the industry level are obtained by summing up the industrial enterprise database. The regression results obtained after adding the RES indicator are shown in the following table.

Table 5. Table of regression results for controlling exports

	(1) 2001-2005	(2) 2001-2010	(3) 2001-2015	(4) 2001-2005	(5) 2001-2010	(6) 2001-2015	(7) 2001-2005	(8) 2001-2010	(9) 2001-2015
rtc06	0.017***	0.014**	-0.009	0.015***	0.001	-0.023***	0.017***	0.009**	-0.009**
	(0.000)	(0.019)	(0.103)	(0.000)	(0.843)	(0.000)	(0.000)	(0.040)	(0.011)
RES	-0.000**	-0.001***	-0.001***	-0.000**	-0.001***	-0.001***	-0.000*	-0.000**	-0.000
	(0.018)	(0.000)	(0.000)	(0.019)	(0.000)	(0.001)	(0.096)	(0.041)	(0.924)
wage2001							-0.000**	-0.000***	-0.000***
							(0.036)	(0.000)	(0.000)
_cons	0.630***	1.368***	1.772***	0.652***	1.390***	1.742***	0.709***	1.629***	2.148***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Province FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	260	260	258	260	260	258	260	260	258
adj. R2	0.114	0.086	0.042	0.377	0.561	0.449	0.386	0.650	0.740

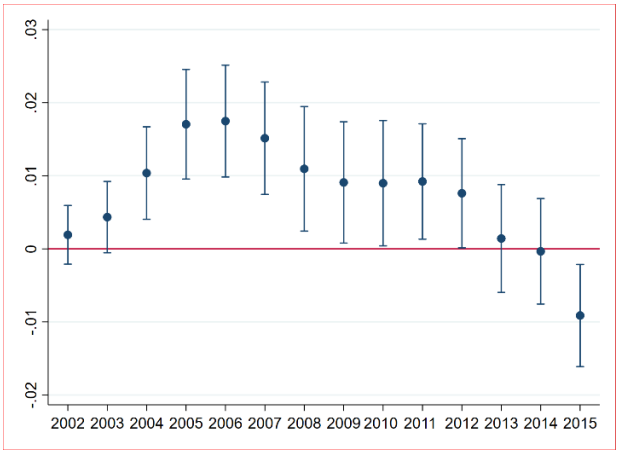


Figure 7. Dynamic corresponding graph of regression results for controlling exports

Control marketization process index: The marketization process index shows the gap in institutional reform among regions, which reflects the relationship between regional government and market, the development of non-state-owned economy, the development degree of product market, the development degree of factor market, the development degree of market intermediary organization and legal system. The inclusion of this index can control the impact of the differences in institutional reform between cities on the empirical results. This paper refers to the marketization process index compiled by Goldberg(2003)[11], and the specific results are shown in the following table:

Table 6. Table of regression results for controlling RES

	(1) 2001-2005	(2) 2001-2010	(3) 2001-2015	(4) 2001-2005	(5) 2001-2010	(6) 2001-2015	(7) 2001-2005	(8) 2001-2010	(9) 2001-2015
rtc06	0.018***	0.006	-0.018***	0.018***	0.007	-0.017***	0.019***	0.012***	-0.009***
	(0.000)	(0.272)	(0.001)	(0.000)	(0.142)	(0.001)	(0.000)	(0.003)	(0.007)
m2001	-0.006	-0.050***	-0.054***	0.142***	0.221***	0.100*	0.114***	0.118**	-0.064
	(0.240)	(0.000)	(0.000)	(0.001)	(0.000)	(0.089)	(0.009)	(0.019)	(0.115)
wage2001							-0.000***	-0.000***	-0.000***
							(0.008)	(0.000)	(0.000)
_cons	0.631***	1.498***	1.918***	-0.057	0.278	1.228***	0.154	1.055***	2.462***
	(0.000)	(0.000)	(0.000)	(0.774)	(0.283)	(0.000)	(0.467)	(0.000)	(0.000)
Province FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	260	260	258	260	260	258	260	260	258
adj. R^2	0.099	0.197	0.201	0.365	0.533	0.423	0.381	0.645	0.742

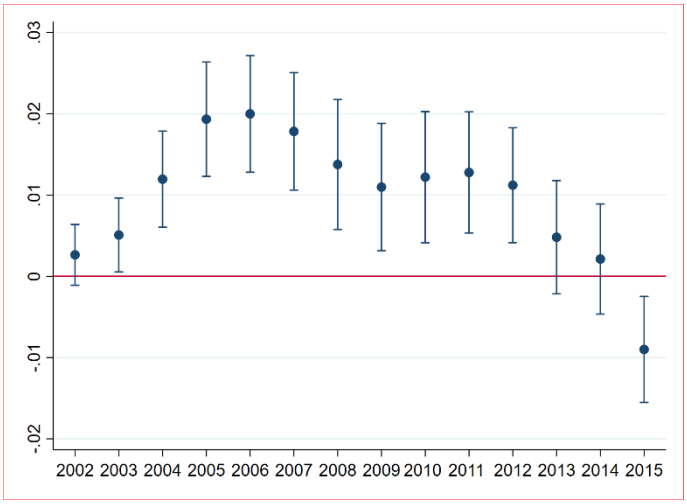


Figure 8. Dynamic corresponding graph of the regression results for controlling RES

4. Conclusion

In the previous five chapters, this paper makes a systematic study on the relationship between trade liberalization and regional wage changes from both theoretical and empirical aspects.

Through theoretical analysis, we find that due to the import competition effect, trade liberalization will have a negative impact on regional wage changes, and through the slow adjustment of capital stock and agglomeration economy, the impact may be more and more large over time.

In the empirical study, this paper draws the following conclusions. Second, different from what classical theory predicts, the impact of import tariff concessions on regional wage levels shows a hump-shaped effect over time that first rises and then falls. Moreover, this dynamic effect is still significant when the tariff level in 2001 is used as the instrumental variable and the economic and policy shocks of export and marketization process are controlled. Thirdly, the level of regional wage shock caused by tariff concessions in industries with different degrees of comparative advantage is different. Tariff reduction in highly competitive industries and moderately competitive industries has a negative effect on urban relative wage growth, while tariff reduction in highly competitive industries and weakly competitive industries has a positive effect on urban relative wage growth. Fourthly, the impact of import tariff concessions on different economic regions is also heterogeneous. Moreover, the impact of trade liberalization first affects the economically developed regions in the eastern region, and then affects the central and western regions in turn.

References

[1] Dai M , Huang W , Zhang Y . Persistent effects of initial labor market conditions: The case of China's tariff liberalization after WTO accession[J]. Journal of Economic Behavior & Organization, 2020, 178.

[2] Zhou S, He B, Pang S. Trade liberalization and regional labor market dynamics: Evidence from China's WTO accession[J]. Journal of International Money and Finance, 2022, 125: 102635.

[3] Dai M , Huang W , Zhang Y . How do households adjust to tariff liberalization? Evidence from China's WTO accession[J]. Journal of Development Economics, 2021, 150(4):102628.David H, Dorn D, Hanson G H. The China syndrome: Local labor market effects of import competition in

the United States[J]. American economic review, 2013, 103(6): 2121-68.

[4] Kovak, Brian K. 2013. "Regional Effects of Trade Reform: What Is the Correct Measure of Liberalization?" American Economic Review 103 (5): 1960-7

[5] Dix-Carneiro R, Kovak B K. Trade liberalization and regional dynamics[J]. American Economic Review, 2017, 107(10): 2908-46.

[6] Dix-Carneiro R, Kovak B K. Margins of labor market adjustment to trade[J]. Journal of International Economics, 2019, 117:125-142.

[7] Autor, David H , Dorn, et al. The China Syndrome: Local Labor Market Effects of Import Competition in the United States.[J]. American Economic Review, 2013.

[8] Arias J, Artuc E, Lederman D, et al. Trade, informal employment and labor adjustment costs[J]. Journal of Development Economics, 2018, 133: 396-414.

[9] Bastos P, Santos N. Long-run effects of trade liberalisation on local labour markets: Evidence from South Africa[J]. The World Economy, 2022, 45(10): 3059-3079.

[10] Topalova P. Factor immobility and regional impacts of trade liberalization: Evidence on poverty from India[J]. American Economic Journal: Applied Economis, 2010, 2(4): 1-41.

[11] Goldberg P K, Pavcnik N. The response of the informal sector to trade liberalization[J]. Journal of development Economics, 2003, 72(2): 463-496.