

Opening to the outside world, Industrial upgrading and Labor market integration: An empirical study of Chinese data from the perspective of enterprise ownership structure

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Abstract. Based on the panel data of 31 provinces in China from 2011 to 2020, this paper studies the impact of opening to the outside world on labor market integration under the mechanism of industrial structure upgrading from the perspective of enterprise ownership structure. The findings are as follows: (1) the increase in opening to the outside world significantly reduces the average wage gap and employment gap between state-owned and non-state-owned sectors, which contributes to the integration of the Chinese labor market; (2) The level of opening to the outside world has a significant effect on the upgrading of industrial structure, industrial upgrading is a mechanism of opening to the outside world affecting our labor market integration; (3) The effect of the level of opening to the outside world on labor market integration has obvious regional characteristics. The findings of this paper have important implications for understanding the relationship between opening to the outside world and labor market integration from the perspective of different enterprise ownership structures and the mechanism of industrial structure upgrading.

Keywords: Opening to the outside, Labor market integration, Ownership structure, Industrial upgrading.

1. Introduction

Since the 40 years of reform and opening up, China's economy has made greatly achievements that have caught the world's attention, and opening up to the outside world has played an irreplaceable role in the process of China's economic rise (Lan, Yisheng, 2002). The established literature has found that opening up to the outside world has contributed to China's economic growth in different ways from technology spillover (Tang, Weibing et al., 2014), human capital accumulation (Xu and Lian, 2006), and economic system (Yang, X., 2014). Its not only brings a large amount of capital to China and creates a large number of employment opportunities, but also makes the structure of China's labor market is undergoing profound changes. As the most core, valuable and subjective factor of production in economic development, the optimal allocation of labor force is of strategic importance to the construction of a large national unified labor market (Zhang, Chunhua et al., 2022). At present, there are more research results related to labor market integration and wage gap at home and abroad, and economic opening may affect the degree of labor market integration in China by removing the barrier factors of labor migration in China (Zhou Shen, 2010) and promoting greenfield investment (Huang Ning, 2015). Among them, most of the literature has mainly studied from inter-regional, inter-industry and inter-urban-rural perspectives. In contrast, in recent years, opening up to the outside world and integrating international market elements, China has gradually formed a more complete industrial chain with a gradually rational industrial structure and significant upgrading of industrial levels, and on this basis has created the development of many local non-state sectors, which has prompted a shift in the direction of labor mobility. With the dynamic non-state sector gaining a foothold in the fierce international market competition and increasing its international competitiveness, the employment system has also diversified, and the research on labor market integration from the perspective of different enterprise ownership structures is equally important.

Since the 18th Party Congress, China has unshakably consolidated and developed the public ownership economy, continuously deepened the reform of state-owned enterprises and state-owned

assets, unshakably encouraged, supported and guided the development of the non-public economy, actively supported the private economy, stimulated the vitality of the non-public economy, and mutually promoted multiple ownership economies and greatly liberated the social productivity. Studies on ownership structure have received extensive attention from scholars at home and abroad, and ownership diversification not only has different incentive effects on firm performance (Hu Yifan et al., 2006), but also its close relationship with residents' employment choices and labor market segmentation (Hu Fengxia, 2011).

However, since the full implementation of the negative list system for market access in China starting in 2018, there are many hidden barriers to entry of market players in practice, and one of the essential reasons is that ownership discrimination has still not been fundamentally eliminated. There are large differences in the wage determination mechanisms of enterprises with different ownership systems, which have significant effects on the wage gap of labor force with different household registration (Chang Jinxiong et al., 2016) and employment problems (Li Yong, 2015). Efficiency and equity have always been at the core of economic research, and the introduction of foreign investment development has become an important aspect of the restructuring of ownership in China (Liu Jingjiao, 2019). It is thus clear that the issue of labor market integration regarding the opening up to the outside world for enterprises with different ownership systems cannot be ignored. In April 2020, Xi Jinping, general secretary of the Communist Party of China (CPC) Central Committee, emphasized the need to promote the construction of a unified national market with a high level of opening up to the outside world. Facing nowadays, when China is actively integrated into the global value chain, what kind of impact does the ownership structure face in the new era, how does the opening up to the outside world affect the labor market integration from the perspective of state-owned and non-state-owned sectors, and whether there is an inherent mechanism of industrial upgrading in it, which becomes the key question to be studied in this paper.

This paper selects panel data from 31 Chinese provinces for the period 2011-2020 for empirical testing, and the benchmark regression results find that each 1% enhancement in China's level of openness to the outside world causes a 0.028-unit reduction in the average wage gap between state-owned and non-state-owned units and a 0.059-unit reduction in the employment gap. This relationship still holds even under the most stringent two-way fixed effects model; at the mechanism level, this paper finds that industrial upgrading is an important mechanism for opening up to the outside world to promote labor market integration under different enterprise ownership structures, and every 1% increase in the level of opening up to the outside world increases the overall industrial structure upgrading index by 0.08 units; on this basis, this paper also conducts some heterogeneity analysis, and the results of the study find that The promotion effect of the degree of external openness on labor market integration under different enterprise ownership structures is more significant in eastern regions as well as coastal regions.

Compared with previous studies, the marginal contribution of the article may be that (1) regarding the impact of external opening on domestic labor market integration, a large amount of previous literature has been categorized and cut from different regions (Xie Fei et al., 2021), different industries (Lu, 2007), and urban-rural perspectives (Li Hong et al., 2019; Zhang Shuli et al., 2016). Only a small part of the literature explores the impact of foreign opening on the labor market based on the perspective of different firm ownership structures. This paper complements them to better portray the changes in the employment gap between state-owned and non-state-owned units in the process of gradual opening; (2) the existing literature has studied the negative relationship between foreign opening and labor market segmentation from the perspectives of reducing the adjustment cost of factor markets (Sun, Meng, 2011) and improving the degree of labor mismatch (Guo, Cece et al., 2020), respectively. This paper introduces industrial upgrading as a mechanism for the first time to explore the impact of foreign opening on the employment gap between state-owned and non-state-owned units. It helps to provide policy recommendations for industrial upgrading and layout optimization, determine the focus of application of opening-up policies in different industrial fields,

promote industrial structure in the direction of high value-added and high technology content, and improve social productivity.

The remainder of this paper is structured as follows: Part II is the literature review and hypothesis formulation; Part III is the research design; Part IV is the empirical analysis; and Part V is the conclusion and policy recommendations.

2. Literature review and hypothesis formulation

After more than four decades of development, the degree of China's opening up to the outside world has been expanding, and its impact on the disparities in various aspects of China's labor market has received extensive attention from scholars at home and abroad. The existing literature is mainly analyzed based on two types of perspectives: one is the impact of opening up to the outside world on the urban-rural income gap, which is the direction of attention of many scholars. And the impact on the urban-rural income gap is divided into three conclusions, among which, the studies of Zhao Ying (2003), Shen Guilong et al. (2011), and Xu Xiaoqi et al. (2019) show that the expansion of foreign opening will lead to further expansion of the urban-rural income gap; a small number of scholars such as Chen Yi et al. (2009) and Fan Aijun et al. (2010) argue that the expansion of FDI inflow makes China's income distribution situation A few scholars, such as Chen Yi et al. (2009) and Fan Aijun et al. (2010), argue that the expansion of FDI inflow makes China's income distribution more equitable and supports the conclusion that the income gap is narrowed; Song Yongchao et al (2013), Li Yanan et al (2015) and Li Yuhui (2017) pointed out that through the analysis of provincial Panel data, the improvement of opening-up and the urban-rural income gap in China show a "U-shaped" relationship of first narrowing and then expanding. The second is the impact of opening up on the income gap of different industries: Lu (2007) shows that opening up causes the income gap of industries to widen; Zhang (2016) concludes that the opening up of the economy reduces the wage and income gap of industries. Thus, it can be seen that there is always a lack of consensus on the effect of opening up to the outside world on the employment gap under the above perspectives.

In fact, the issue of employment gap under different ownership enterprises is also an important reflection of labor market integration. With the reform of ownership structure, the employment structure inevitably adjusts and brings about changes in the labor market: Knight and Song (2003) and Parketal (2003) agree that the changes in the state-owned sector and the development of the non-state sector bring about significant effects on the allocation of labor resources and the income distribution of urban workers. Li (2003), Maurer-Fazio (1999), and Zhang and Zhao (2002) find significant differences in the returns to workers with different education levels between the state and private sectors, and emphasize that the non-state sector has higher returns to educational experience. sector has higher returns to educational experience. On this basis, Chen (2005) suggest that the segmentation of the Chinese labor market or multilevel, pure ownership differences is one of the main determinants of the observed wage gap. It follows that firm ownership is potentially important in explaining the employment gap problem and that the Chinese labor market is likely segmented by ownership type. However, as far as reading, only a small number of studies have examined the effect of the degree of opening up to the outside world on labor market structure based on the perspective of firm ownership: Chen, Lin et al. (2009) show that the spillover from opening up to the outside world varies greatly depending on the structure of firm ownership, and its discriminatory system for firms with different ownership may be a key factor that hinders the spillover from opening up to the outside world; Tian, Siyuan et al. (2022 (2022) study the impact of import of intermediate goods on the change of employment ownership structure and propose that the expansion of foreign opening and the construction of socialist market economy system complement each other, and promote the construction of a more perfect institutional mechanism of factor market allocation in order to fully release the trade dividend; Liu Ruiwen et al. (2020) find that trade opening can improve the efficiency of resource allocation through the adjustment of labor structure of enterprises with different ownership. In the research scenario of this paper, with the deepening degree of external openness,

resource allocation efficiency is improving and enhancing labor factor agglomeration, which may have a negative effect on the employment gap between state-owned and non-state-owned sectors; based on this, this paper proposes the hypothesis that

H1 The degree of external openness has a positive effect on labor market integration under different ownership enterprises.

Meanwhile, the series of reports on the achievements of economic and social development in the 70th anniversary of the founding of New China show that the increasing degree of external openness has gradually increased the international competitiveness and influence of "Made in China", and the industrial structure has been continuously optimized, realizing the transformation from agriculture-oriented to the synergistic development of three industries. The degree of opening up to the outside world is closely related to industrial upgrading. The research on opening up to the outside world and industrial upgrading is mainly focused on the path of industrial upgrading and the influencing factors. In the new development stage, opening up to the outside world leads to the formation, development and growth of new industries, which is an effective path to achieve industrial competitiveness upgrading (An, Liwei et al., 2010). Domestic and foreign literature has studied the influence mechanism of foreign opening on industrial upgrading from the perspectives of OEM-ODM-OBM path (Hobday, 2002), factor endowment structure (Yin Gongli, 2018), science and technology investment (Pu Zuoyi, 2013), and global value chain (Zang Cheng et al., 2022). In the research scenario of this paper, industrial upgrading may be a mechanism by which foreign opening affects the integration of China's labor market. Based on this, this paper further proposes the hypothesis that

H2 External opening affects labor market integration under different ownership enterprises by promoting industrial upgrading.

3. Study design

3.1. Data sources and variable settings

This paper focuses on the impact of opening up to the outside world on labor market integration under the mechanism of industrial upgrading based on the perspective of enterprise ownership structure using panel data of 31 provinces in China during the period of 2011-2020. The data used for the study are obtained from the China Statistical Yearbook and the China Statistical Yearbook of Industrial Economy. This paper firstly cleans the data, screens the data and removes the irrelevant data from the original data; then carries out data integration, unifies and corrects the data of different measurement units; finally carries out data transformation, transforms the data into an appropriate form by changing the function and normalization.

Since this paper focuses on the impact of the degree of openness to the outside world on labor market integration, this paper uses the employment gap between the state and non-state sectors (AVSAGAP and EMGAP) to reflect labor market integration (INTEG), and uses this as the explanatory variable and the level of openness to the outside world (OPEN) as the explanatory variable. The following is a brief explanation and description of the selection and measurement of each variable in this paper.

3.1.1. level of opening up to the outside world (OPEN)

According to previous studies, there are various ways to measure the level of opening up to the outside world, among which are Wang Bin et al. (2022) who use the proportion of the frequency of words related to opening up to the outside world in the government work reports of each province (region and city) as a measure of its development level, and Song (2016) who selects the proportion of total foreign direct investment in each region to its total social fixed asset investment as a proxy indicator of the level of opening up to the outside world. However, in the empirical studies, most scholars equate the level of external openness with trade openness. This paper draws on the approach of Ru-Yu Zhao et al. (2021) and uses the ratio of total import and export trade to GDP to indicate the level of openness to the outside world. The larger the ratio, the closer the economic development is

to the world, i.e., the higher the level of openness to the outside world. The total amount of import and export is converted using the mid-price of RMB/USD exchange rate.

3.1.2. Industrial Upgrading (IUP)

Industrial structure upgrading includes both intra-industry upgrading characterized by climbing added value and improving production efficiency, and inter-industry upgrading characterized by optimized factor allocation and coordinated sectoral development. There are various methods to measure industrial upgrading, among which foreign measurement methods on industrial upgrading are more complete, such as Hoffman's proposal to explain the law of industrial structure evolution in the industrialization process of a country or region by the ratio of the net industrial output value of consumption data to the net industrial output value of capital data, the standard structure method proposed by Chinnery, and the theory of goose travel pattern by Akamatsu to be. However, these methods are more demanding in terms of data requirements, and they require high-quality samples of uniform caliber for measurement over many years, and the data on industrial upgrading in China do not support these statistical methods. Chinese scholars measure industrial upgrading mainly into two categories: one is to reflect industrial structure upgrading by measuring the proportional relationship of each industry, such as Zuo Pengfei et al. (2020) using the share of the tertiary industry in GDP as a measure, and Gan Chunhui et al. (2011) using the ratio of the output value of the tertiary industry to the output value of the secondary industry as a measure; the other is to use the product of the output ratio of each industrial sector and labor productivity as a measure of industrial structure upgrading, such as Liu Wei et al. For example, Liu and Wang (2008) use the "conversion share analysis" method to decompose the structural change effect from labor productivity growth, and Tian and others (2012) use the product of the proportional relationship and standardized labor productivity as the measurement index. In this paper, we borrow the method of Yu and Wang (2021) and Zhou Changlin et al. (2007) to measure industrial upgrading, and assign values to three industries and weight them to obtain the industrial structure hierarchy coefficients to characterize the overall industrial structure

upgrading level. The specific formula is
$$IUP = \sum_{i=1}^3 (y_i \times i)$$
, where y_i is the proportion of value added of the i industry to GDP.

3.1.3. Labor Market Integration (INTEG)

Currently, when discussing the ownership structure in China, most studies divide the ownership structure into "state-owned economy" and "private economy" (or non-state-owned economy, which includes collective economy, private economy, Hong Kong, Macao, Taiwan and foreign investment economy, etc.). In the process of deepening China's participation in global value chains, the expansion of the level of openness to the outside world can increase the cross-sectoral labor mobility and promote the flow of labor from state-owned enterprises to non-state-owned enterprises. Different scholars have different views on the measurement of labor market integration under different enterprise ownership structures, such as Zhang Qingjun et al. (2016), who use the total assets of state-owned and state-controlled enterprises divided by the total assets of the three types of enterprises as a variable, and Li Bo et al. (2012), who measure the number of workers in state-owned enterprises as a proportion of the total number of local workers in each region when studying the impact of ownership structure on the efficiency of technological innovation. Referring to most studies, this paper divides China's ownership structure into state-owned and non-state-owned economies, and draws on Zhao's (2001) measure and optimizes it to measure labor market integration under different enterprise ownership structures as the standardized average wage gap in employment (AVSAGAP) and the gap in year-end employment (EMGAP).

3.1.4. Other control variables

To avoid omitting variables that lead to biased regression results, this paper introduces railway density (RWDEN), road density (HWDEN), the level of technological development (TECH), and the level of foreign direct investment (FDI) as control variables in the model.

Railroad density (RWDEN): This indicator is measured as road miles per unit area in each province. It indicates the condition of road transportation infrastructure. Road transportation is characterized by its accessibility and flexibility in all directions and is a necessary way to achieve door-to-door transportation of goods. The superiority of road transportation resources should have a significant impact on the efficiency of cross-regional circulation of goods and, to some extent, on employees' choice of enterprises with different ownership.

Highway density (HWDEN): This indicator is measured in terms of railroad miles per unit area in each province. It indicates the condition of railroad transportation infrastructure. The vastness of China's territory and the uneven distribution of economic resources determine the importance of long-distance transport of goods as well as labor in transportation over a long period of time. Railroad transportation has certain advantages over other transportation modes in terms of speed, load capacity and adaptability to weather conditions.

Foreign Direct Investment (FDI): This indicator is expressed as the total amount of actual foreign investment utilized by each province/GDP, and the actual amount of foreign investment utilized is converted by the average exchange rate of RMB/USD in each year. the FDI indicator reflects the size of the influence of foreign direct investment on economic development.

Technological development level (TECH): This indicator is measured by the proportion of government expenditure on science and technology to fiscal expenditure. It indicates the degree of government intervention in the level of technological development in the province. The advancement in the level of technological development is the basic condition for productivity improvement in enterprises of different ownership, and the level of government support to the relevant enterprises has become an important factor in the current labor mobility.

Table 1. Descriptive statistics of variables

Variables	Obs	Mean	Std.dev.	Min	Max
OPEN	310	0.247	0.265	0.007	1.458
IUP	310	2.378	0.128	2.166	2.836
EMGAP	310	1.782	2.471	0.002	12.565
AVSAGAP	310	1.301	1.227	0.004	6.649
RWDEN	310	0.027	0.029	0.0004	0.391
HWDEN	310	0.915	0.517	0.051	2.205
FDI	310	0.020	0.019	0.0001	0.121
TECH	310	0.020	0.015	0.003	0.068
LNGDP	310	18.952	0.983	15.617	20.825
GOV	310	0.284	0.210	0.110	1.379

3.2. Model design

This paper focuses on the impact of China's opening up to the outside world on the employment gap under different enterprise ownership structures; therefore, this paper tries to construct a linear model with two-way fixed effects (including regional fixed effects and year fixed effects) for analysis (equation 1).

$$INTEG_{it} = \alpha_0 + \alpha_1 OPEN_{it} + \sum \lambda_k CONTROL_{kit} + \mu_i + \gamma_t + \varepsilon_{it} \quad (1)$$

In equation 1, i and t denote region and year, respectively; $INTEG_{it}$ represents the labor force integration in region i in year t, which is specifically expressed as the employment gap under different ownership firms, and the employment gap can be measured from two perspectives, the normalized year-end employment gap in region i in year t ($EMGAP_{it}$) and the average wage gap in region i in year t ($AVSAGAP_{it}$); $OPEN_{it}$ denotes the degree of openness of region i in year t; $CONTROL_{kit}$ represents the set of control variables at the level of year t in region i, which contains $RWDEN_{it}$ (rail density in region i in year t), $HWDEN_{it}$ (road density in region i in year t), FDI_{it} (foreign direct investment in region i in year t), and $TECH_{it}$ (level of foreign direct investment in region i in year t).

And $TECH_{it}$ (technology development level in region i in year t). In addition, to avoid missing important explanatory variables in the regressions, we control for region as well as year fixed effects in the model. The region effects are controlled to incorporate factors regarding relevant characteristics at the region level, such as geographic location, etc.; the year fixed effects incorporate the effects regarding year characteristics on the regressions, such as unexpected events in the current year, etc. ε_{it} denotes the random disturbance term.

In addition, considering the mechanism role of industrial upgrading in the study, this paper further constructs a linear model of foreign opening and industrial upgrading (equation 2), which is as follows:

$$IUP_{it} = \beta_0 + \beta_1 OPEN_{it} + \beta_2 LNGDP_{it} + \beta_3 GOV_{it} + \theta_i + \delta_t + \eta_{it} \quad (2)$$

In the equation 2, i and t denote the region and year, respectively; IUP_{it} represents the industrial upgrading index of region i in year t , which is specifically the overall upgrading level of industrial structure; $OPEN_{it}$ represents the degree of opening-up level of region i in year t ; because the degree of regional economic development is the guarantee of industrial upgrading, the logarithm of GDP is introduced as a control variable in the 2 equation, i.e., $LNGDP_{it}$ represents the The logarithm of GDP; secondly, the government's ability to regulate the economy can promote the formation of a good competitive system for enterprises and guide local industrial upgrading (Zangcheng et al., 2022), so the regional general fiscal expenditure as a proportion of GDP is introduced in equation 2 to indicate the government's ability to intervene (GOV_{it}). Similarly, this paper controls for regional as well as year fixed effects in the mechanism model to absorb the effects of regressions about regional level as well as year characteristics, which are used to avoid important explanatory table variables missed in the regressions. η_{it} denotes the random disturbance term.

4. Empirical Analysis

4.1. Basic regression results

This paper focuses on how foreign opening affects labor market integration under different enterprise ownership in China, and this paper adopts the standardized average wage gap of employed persons under different ownership enterprises and the gap in the number of employed persons at the end of the year for quantification. Therefore, this section first adopts the stepwise regression method to test the impact of foreign opening on labor market integration. Columns (1)-(2) of Table 2 show the results of using the average wage gap between employed persons in the state-owned and non-state-owned sectors as the explanatory variables, and columns (3)-(4) of Table 2 show the results of using the explanatory variables around the gap between the number of employed persons in the state-owned and non-state-owned sectors at the end of the year, adding in turn the degree of opening up to the outside world and the set of control variables, with all results using region and year fixed effects. The results of the econometric tests show that the level of external openness has a significant negative effect on the average wage gap between the state-owned and non-state-owned sectors as well as on the employment gap: without adding control variables, for every 1% increase in external openness, the average wage gap between the state-owned and non-state-owned sectors decreases by about 0.029 units and the employment gap decreases by 0.063 units; with the addition of With the inclusion of control variables, the average wage gap between the state-owned and non-state-owned sectors decreases by 0.028 units and the employment gap decreases by 0.059 units for each 1% increase in external openness. It can be seen that, even when the control variables absorb certain effects, with the development of foreign trade and the increase in the degree of integration into the international market in each region, the increase in the degree of external openness significantly contributes to the reduction of the employment gap between the state-owned and non-state-owned sectors and helps to promote the integration of the labor market under different ownership enterprises, which verifies hypothesis H1.

Table 2. Basic Regression Results

	(1)	(2)	(3)	(4)
	AVSAGAP	AVSAGAP	EMGAP	EMGAP
OPEN	-2.9888** (1.2182)	-2.7532** (1.0256)	-6.2615*** (2.1327)	-5.9966*** (1.4354)
RWDEN		-3.0288*** (0.9058)		2.2024*** (0.5538)
HHWDEN		0.8777 (1.0594)		0.7965 (0.7600)
FDI		-9.6224 (8.1235)		-10.6651* (5.6689)
TECH		40.5576** (15.6486)		50.2194*** (14.8231)
Constant	1.6239*** (0.3703)	0.4260 (0.8933)	3.0874*** (0.5167)	1.6912** (0.6887)
Area Fixed	Fixed	Fixed	Fixed	Fixed
Year Fixed	Fixed	Fixed	Fixed	Fixed
Observations	310	310	310	310
R ²	0.5422	0.6058	0.2587	0.3267

Note: *, **, and *** represent 10%, 5%, and 1% significance levels, respectively, and values in parentheses indicate t-values.

As for the control variables, both railroad density and the level of foreign direct investment are conducive to the reduction of the employment gap between state-owned and non-state-owned units, with railroad density playing a significant role, probably because railroad transportation is more suitable for the long-distance transportation of bulk primary products and industrial goods in terms of speed, load capacity and adaptability to weather conditions, etc., and China, as a large industrial country with a full range of industrial categories, is in the process of industrialization in China. When the private sector is a very important part of China's industrialization, railroad density to a certain extent to improve the productivity of private enterprises, the efficiency of foreign trade, etc., affecting the average wage of workers and the selective preference of employment of different ownership; the level of technological development plays a significant role in promoting the employment gap, which may be due to the fact that the phenomenon of ownership discrimination is still very serious in China, with the government's state-owned enterprises. With the increase of government spending on science and technology, the visible hand of the government on the direction of labor mobility caused by the market tends to the state-owned sector as well as providing financial support for R&D in the state-owned sector, which widens the employment gap between the state-owned and non-state-owned sectors; the role of road density is positive and the role of foreign direct investment level is negative, but neither is significant.

4.2. Robustness test

In order to ensure the reliability of the estimation results in this paper, robustness analysis was conducted in two aspects. The results are shown in Table 3.

Table 3. Robustness regression results

	(1)	(2)	(3)	(4)
	AVSAGAP	EMGAP	AVSAGAP (Excluding the 2020 sample)	EMGAP (Excluding the 2020 sample)
OPEN (Lags behind the first period)	-3.2524*** (0.9573)	-3.2366*** (1.0105)		
OPEN			-1.9679* (1.0717)	-6.5044*** (1.5759)
RWDEN	-2.7504*** (0.7821)	2.1405*** (0.4511)	40.0174 (30.6950)	19.8690 (32.2474)
HWDEN	1.0021 (1.0807)	0.8353 (0.6124)	0.2926 (1.2942)	0.4520 (0.8428)
FDI	-8.1253 (7.7658)	-3.7947 (3.7619)	-4.7761 (7.3846)	-9.0012 (7.1852)
TECH	41.3139** (16.4052)	33.1594** (13.1295)	32.0561** (12.6082)	51.0393*** (13.9039)
Constant	0.3286 (0.8701)	0.9560* (0.5231)	-0.2286 (1.2047)	1.6916 (1.2316)
Area Fixed	Fixed	Fixed	Fixed	Fixed
Year Fixed	Fixed	Fixed	Fixed	Fixed
Observations	279	279	279	279
R ²	0.6105	0.2120	0.5686	0.3342

Note: *, **, and *** represent 10%, 5%, and 1% significance levels, respectively, and values in parentheses indicate t-values.

4.2.1. Using the level of foreign openness with a one-period lag as the explanatory variable

Since the level of foreign openness, the number of employed persons, and the average wage all have long-run cumulative effects, the level of foreign openness in the previous period will have an impact on the average wage and the number of employed persons under different ownership enterprises in the current period. In this paper, we adopt the lagged one-period level of foreign opening as a proxy for explanatory variables and conduct a linear regression with two-way fixed effects for estimation, and the results are reported in columns (1) and (2) of Table 3. It can be seen that the coefficient of the level of foreign openness in the lagged period is still negative and significant at the 1% level, which has a significant negative effect on the gap between the average wage gap and the employment gap. The coefficient signs and significance levels of the other explanatory variables are more consistent compared to columns (2) and (4) in Table 2. This shows that the regression results do not change significantly due to changes in the number of periods of the explanatory variables.

4.2.2. Exclude some samples

According to the National Bureau of Statistics, under the impact of the epidemic, the national urban survey unemployment rate will average 5.6% in 2020, an increase of nearly 50% compared to 2019. The main reasons for this are these aspects: first, the epidemic has led to the suspension of salary for some employees, which is actually equivalent to the state of unemployment; second, some migrant workers are unable to return to the city to work under the state of comprehensive social epidemic prevention; third, some employees are unable to work normally in the quarantine period, and the mandatory quarantine measures are unable to actually engage in production activities for a short period of time; fourth, some private enterprises are unable to produce normally under the epidemic, and their capital Chain breakage has resulted in the inability to make regular payroll and a large number of layoffs. It can be seen that the regression data in 2020 may be biased due to the impact of the epidemic. Therefore, this paper excludes the sample of 2020 for linear regression with two-way fixed effects, and the regression results are shown in columns (3) and (4) of Table 3. It can

be found that the regression coefficient of the level of foreign openness is still negative, and the sign and significance level of the coefficients of other explanatory variables do not change significantly compared with columns (2) and (4) in Table 2. Therefore, overall, the exclusion of the abnormal sample intervals did not have a substantial effect on the estimation, indicating that the regression results of the model are robust and credible.

4.3. Mechanism regression results

This paper further examines the role of the mechanism of industrial upgrading and studies the influence of the level of foreign openness on industrial upgrading, and the regression results are shown in Table 4. The empirical results show that the level of foreign openness has a significant positive effect on the industrial upgrading index, indicating that with the overall improvement of China's foreign openness level and promoting the development of trade innovation, its mechanism to accelerate the modern industrial system and promote industrial structure upgrading is established. However, with the regression results of adding control variables, this mechanism is only significant at 1% significance level, which may be due to the fact that the effect of opening up to the outside world on industrial upgrading is not limited to within provinces, but its linkage effect between provinces is also promoted. However, just when the index of industrial upgrading is underestimated, there is still a significant positive effect of opening up to the industry provincial index, further verifying the rationality of the mechanism and validating hypothesis H2.

Table 4. Regression results of the mechanism

	(1) IUP	(2) IUP
OPEN	0.1073** (0.0441)	0.0823* (0.0483)
LNGDP		-0.0584 (0.0412)
GOV		-0.1262 (0.1819)
Constant	2.2636*** (0.0154)	3.3888*** (0.7754)
Area Fixed	Fixed	Fixed
Year Fixed	Fixed	Fixed
Observations	310	310
R ²	0.8243	0.8290

Note: *, **, and *** represent 10%, 5%, and 1% significance levels, respectively, and values in parentheses indicate t-values.

4.4. Heterogeneity analysis

First of all, there are large differences between different regions in China in terms of natural environment, resource endowment, economic policies and other factors that determine the level of economic development, thus leading to a relatively obvious gap in economic development between different regions. The economic differences are reflected in many aspects, and the regional differences in the degree of external openness are one of the important elements. In order to further study the influence of the degree of external openness of different regions on labor market integration, this paper divides China's economic regions into four major regions, namely, the east, the central, the west and the northeast, according to the Opinions of the Central Committee of the Communist Party of China and the State Council on Promoting the Rise of the Central Region, the Opinions of the State Council on the Implementation of Certain Policy Measures for the Development of the Western Region and the spirit of the report of the 16th Party Congress. Among them, the eastern region includes: Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and

Hainan; the central region includes: Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan; the western region includes: Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang; and the northeast region includes: Liaoning, Jilin and Heilongjiang. In this paper, regressions are conducted with the eastern region as the control group, and Table 5 shows the regression results for the central, western and northeastern regions. From the empirical results, it can be seen that compared with the eastern region, the effect of the level of external openness on the average wage gap in the central, western and northeastern regions is not significant, but the narrowing effect of its effect on the employment gap is significantly weaker, i.e. the degree of external openness in the eastern region promotes the integration of China's labor market more significantly. The main reason for this is that the opening-up level of different regions in China is in a seriously uneven situation, and the regions with the highest and higher opening-up level are mostly concentrated in the eastern region, while the regions with the lower and lowest opening-up level are mostly concentrated in the central and western regions.

Table 5. Regression results of heterogeneity in different regions

	(1) AVSAGAP	(2) EMGAP
OPEN	-2.3512*** (0.8470)	-6.9174*** (1.4887)
OPEN(the central region)	7.9466 (6.4374)	33.2697** (15.7411)
OPEN(the western region)	-5.0737 (6.3793)	8.3865*** (2.0329)
OPEN(the northeast region)	-1.1332 (3.3585)	15.0923*** (2.5549)
RWDEN	-2.7733*** (0.9522)	2.6133*** (0.6057)
HWDEN	0.9431 (0.9133)	0.8390 (0.6678)
FDI	-10.5159 (7.9510)	-7.1827 (4.6440)
TECH	44.0802*** (14.5042)	50.7274*** (11.8656)
Constant	0.2885 (0.9214)	0.4813 (0.8291)
Area Fixed	Fixed	Fixed
Year Fixed	Fixed	Fixed
Observations	310	310
R ²	0.6200	0.3925

Note: *, **, and *** represent 10%, 5%, and 1% significance levels, respectively, and values in parentheses indicate t-values.

Secondly, there is a big gap between coastal and inland in terms of geographical location, degree of openness and development level, which leads to different impact on the level of openness of the two types of regions. This section attempts to divide China's 31 provinces into two regions, coastal and inland. Specifically, the 11 coastal provinces (autonomous regions) of Liaoning, Hebei, Tianjin, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Guangxi, and Hainan are classified as coastal regions, while the other provinces are considered as inland regions. The regression results are shown in Table 6. As can be seen from Table 6, the increase in the level of opening up to the outside world can all significantly reduce the average wage gap between enterprises of different ownership in coastal and inland regions, and the level of opening up to the outside world has a stronger effect on the reduction of the average wage gap in coastal regions compared to inland regions. In terms of the employment gap, the gap between the state-owned sector and the non-state-owned sector in the

coastal region is significantly reduced by the promotion and driving effect of the open economy, while the coefficient of the effect on the inland region is positive, but not significant. The reason for this difference is that compared with inland regions, coastal regions have been opened up earlier and at a higher level, and the market scale has been expanding, which has increased the productivity of each enterprise, while private enterprises are mainly developed in coastal regions, which attract a large number of jobs and promote labor mobility among enterprises of different ownership.

Table 6. Regression results of heterogeneity between coastal and inland areas

	(1)	(2)	(3)	(4)
	Coastal AVSAGAP	Inland AVSAGAP	Coastal EMGAP	Inland EMGAP
OPEN	-7.3477* (3.6162)	-2.8180*** (0.8014)	-4.8406*** (1.1938)	0.4581 (2.8681)
RWDEN	-2.6051*** (0.5685)	99.1044*** (19.9916)	-71.1746 (61.6637)	1.9591*** (0.4852)
HWDEN	2.2840*** (0.6997)	-2.8320 (1.9985)	-0.2147 (2.4469)	1.4499** (0.5582)
FDI	-16.8729 (10.5673)	2.4157 (5.8577)	-17.9181* (9.5007)	15.9228 (10.8481)
TECH	38.9433*** (13.1427)	21.7141 (19.4574)	84.6013*** (24.7195)	16.2553 (11.7056)
Constant	-0.2131 (0.8637)	2.0314 (1.8858)	5.6689 (3.7900)	-0.7166 (0.6289)
Area Fixed	Fixed	Fixed	Fixed	Fixed
Year Fixed	Fixed	Fixed	Fixed	Fixed
Observations	200	110	110	200
R ²	0.6006	0.8114	0.4937	0.1464

Note: *, **, and *** represent 10%, 5%, and 1% significance levels, respectively, and values in parentheses indicate t-values.

5. Conclusions and Policy Recommendations

Nowadays, the world is in a period of "great development, change and adjustment", and the multiploidization of the world and economic globalization are developing deeply, so a high level of opening up to the outside world is an inherent requirement to speed up the construction of a unified national market. At the same time, with the gradual deepening of ownership theory, the influence of the degree of opening up to the outside world on the integration of labor market under different ownership enterprises has gradually emerged. Based on this background, this paper adopts the inter-provincial panel data of China from 2011 to 2020, constructs a regression model with the level of opening up to the outside world as the explanatory variable, and the average wage gap between the state-owned and non-state-owned sectors and the gap between employed persons as the explanatory variables, and focuses on the influence of the level of opening up to the outside world on the integration of the labor market under different ownership enterprises. The regression model with industrial upgrading as the mechanism as well as the heterogeneity analysis are also constructed on this basis.

The conclusions of this paper are as follows: (1) the increase of the level of foreign opening significantly reduces the average wage gap and the gap of employed persons between state-owned and non-state-owned sectors, which helps to promote the labor market integration in China; (2) the promotion effect of the level of foreign opening on the upgrading of China's industrial structure is significant, and industrial upgrading is a mechanism for foreign opening to influence the labor market integration in China; (3) the effect of the level of foreign opening on The labor market integration has obvious geographical characteristics: compared with the effect in the eastern part of China, its

promoting effect in the central, western and northeastern regions has weakened. At the same time, its effect is significant in the coastal regions, but not in the inland regions.

The findings of this paper have important policy implications: first, the level of opening up to the outside world helps promote the development of labor market integration under different ownership enterprises in China. China should continue to deeply enhance the level of opening up of China's regions to the outside world, standardize the investment attraction policies of local governments, improve the conditions of transportation infrastructure such as roads, and accelerate the construction of domestic market integration; second, the government should relax institutional discrimination against the non-state sector, optimize the business environment, break the hidden barriers to entry, improve the problem of discriminatory ownership in labor force employment choices, and strive to realize economic efficiency. Finally, the government should give full play to the significant role of opening up to the outside world in promoting industrial upgrading, pushing the industrial structure to the direction of high value-added and high technology content, improving social productivity, and striving to make the industrial structure upgrading play a more reasonable role mechanism in the process of labor market integration.

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