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The Impact of Exchange Rate Changes on Wages under the Background of Cross-Border Trade Settlement--Empirical Evidence from China

Weicheng Xu
Assistant Professor &Researcher
School of Economics, Ocean University of China
Institute of Marine Development, Ocean University of China
Address: No.238 Songling Road (OUC Laoshan Campus)
School of Economics Buliding Room 306,Qingdao, China
Tel: (+86)15964238795
E-mail: xuweicheng@ouc.edu.cn

Hairui Liu
Master of Finance
School of Economics, Ocean University of China
Tel: (+86)13791802371
E-mail: haryliu111@163.com

Abstract

Under the background of RMB internationalization, this paper reconstructs the general equilibrium model of the labor market. By introducing the RMB settlement proportion index of cross-border trade, this paper deduces a new trade path of the impact of exchange rate changes on wages, and uses the panel data of China's industrial industries from 2000 to 2019 to examine the overall and heterogeneous impact of exchange rate changes on wages. The results show that in the process of the exchange rate affecting the industry wage level, the negative impact through the net export level path is the most significant, but with the narrowing of the industrial trade surplus and the improvement of the RMB settlement "lameness" characteristics, the above impact will weaken; through the import and export product structure path, it will have a certain positive impact, and it is expected that the role of this path will become more significant; the positive RMB exchange rate expectation has an important effect on the formation of the mechanism of the exchange rate acting on the wage path, but the effect through the currency application and the policy change path is the weakest. The influence of RMB exchange rate on wages of different industries is different due to the heterogeneity of import and export products, and the monopoly level, technical level and trade source are the important factors causing the wage return differences among different industries.

Keywords: Cross-border trade RMB settlement; Industry characteristics; RMB exchange rate; Trade path; Wage level

INTRODUCTION

With the further development of economic globalization, the trade between countries around the world is increasingly close, which brings more opportunities and profits, but also brings risks and crises (Ying et al., 2014). At present, exchange rate change has become one of the key factors affecting international trade and even the economic development of various countries. As the price of RMB in the international market, the change of RMB exchange rate will produce relative price effect, which is bound to affect China's import and export trade, and then impact on the wage level of enterprises. Especially for industries with large number of unskilled labor and high dependence on foreign trade, their wage level is more vulnerable to the impact of exchange rate changes. Since the Reform and Opening-up, China's industrial wage growth has been slow, but it can’t give full play to the role of industrial wage growth.

This makes it an important task for China's wage system reform in the next stage to improve the wage level of industrial sectors and prevent the wage income gap between industries from widening.

It should be noted that as the starting point of RMB internationalization, RMB settlement of cross-border trade is developing in depth. As there are many factors affecting cross-border trade settlement, can these factors change the proportion of RMB settlement, and how the change of the proportion can play a role of risk mitigation in trade, thus affecting the exchange rate risk exposure of China's foreign trade enterprises, leading to changes in the level of import and export trade, and ultimately resulting in the impact of the exchange rate on wages through the trade path change? Therefore, under the background of the in-depth development of cross-border trade settlement and the increasingly obvious two-way fluctuation characteristics of RMB exchange rate, the following issues need to be further studied:

1. How to reconstruct the general equilibrium model of labor market under the background of cross-border trade settlement, so as to deduce a new trade path of exchange rate changes affecting the equilibrium labor wage, and analyze the mechanism and role of exchange rate through the new trade path on wages?

2. How to measure the exchange rate elasticity of wages of 39 industries in China, so as to explore the overall impact of RMB exchange rate changes on wages of 39 industries through a new trade path under the background of cross-border trade settlement?

3. How to select the main industry characteristics to classify 39 industries, so as to explore the influence of RMB exchange rate changes on the heterogeneity of wage levels in different industries under the background of the implementation of cross-border trade settlement, and the role of industry characteristics in the formation of wage return differences among industries?

In order to solve the above problems, this paper reconstructs the general equilibrium model of the labor market under the background of RMB internationalization. By introducing the index of cross-border trade RMB settlement import and export proportion, this paper deduces a new trade path of exchange rate changes affecting wages, and uses the panel data of China's industrial industries from 2000 to 2019 to investigate the overall and differential effects of RMB exchange rate changes on wages qualitative impact. This study reveals that the root of the difference in the impact of RMB exchange rate on wages of different industries in China is the difference in product heterogeneity among industries, which leads to the difference in RMB settlement level of cross-border trade and exchange rate risk of import and export enterprises under different situations of exchange rate changes, resulting in the difference in production cost adjustment and labor demand of enterprises, Finally, it leads to the gap of labor price between industries. This study can provide good policy implications for improving the wage level of China's industrial industry and preventing the expansion of wage income gap under the background of the implementation of cross-border trade settlement.

LITERATURE REVIEW

The research on the impact of exchange rate changes on wages have only risen since the 1980s, and the early literature mainly focuses on empirical research(Branson and Love,1972; Revenga,1992; Burgess and Knetter, 1998). Subsequently, Campa andGoldberg (2001) , Kandil and Mirzaie (2003)explored the theoretical mechanism of the impact of exchange rate changes on wages by building a general equilibrium model of the labor market.On this basis, many scholars have investigated the different effects of exchange rate on wages.Raymond Robertson (2003) founda significant positive correlation between actual exchange rates and actual wages in Mexico, with the relationship weaker in industries and regions that are more exposed to foreign competition,and Hua(2007) alsoreached the same conclusion.Alfaro et al.(2020) found thatfundamentalconsiderations raise importing intermediates' costsand then reduce workers' wages.Weicheng Xu's (2019)research shows that RMB's depreciation will promote labor-intensive manufacturing sectors' employment and wage growth in China. Hua(2020) came to a similar conclusion; Schnabland Ziegler (2011) found that in the long term, a stable exchange rate will be conducive to promoting wage growth by studying the exchange rate system in Central and Eastern Europe. However, Canzoneriand Underwood(1984) believed that there is no significant difference between the two models in capital contracts, the effect of actual exchange rate change on wages is not significant.Alexandre et al.(2011) also found that exchange rate fluctuations in high-tech manufacturing have little impact on the labor market.

Besides, some scholars have examined the impact of exchange rates on the heterogeneity of wages in different enterprises orindustries.The research on enterprises is as follows:The research of Caselliand Chatterjee (2017) shows that the effect of exchange rate changes on wages of enterprises with varying levels of productivity is not consistent, and wages of enterprises with higher productivity respond more strongly to exchange rate changes. Theresearchs of Nucci andPozzolo(2014), Campbell and Lusher (2019) find that wages of enterprises with lessmarket power and lower technical level are more vulnerable to exchange rate changes. At the same time, many scholars also discussed industry characteristics' role in the wage difference between industries. Cheng-chung Lai's (1989) research finds that the wage gap between industries is significantly related to the market concentration, and the different market structure is the crucial reason for the wage gap. The researchs of Creedyand Robert(1998), Demurgerand Martin(2006) show that the difference of human capital stock and business activities' nature are the critical factors that cause the wage gap between industries. Gabriela(2015), based on Mexico's data from 1994 to 2004, shows that the degree of trade openness has no statistically significant impact on the wage difference between industries. There is a positive non-linear relationship between FDI and industry wage.Belkeand Volz (2020) also found significant adverse effects of the real effective yen exchange rate on specific industrial output.

According to the above literature, exchange rate changes can influence wages through the import and export trade path, while RMB internationalization will have a profound impact on the trade path. Many studies have shown that RMB internationalization is conducive to the realization of trade integration between China and other countries (Aizenmen, 2015). By constructing RMB outflow and return mechanism, it can reduce the mismatch of funds in external financing and reduce exchange rate risk (Li and Qian, 2011; Li and Zhang, 2017), so as to improve the business environment of enterprises and optimize the trade path of exchange rate affecting wages. In recent years, the status of labor-intensive industries in the international value chain has been rising, which leads to the rise of the discourse power of enterprises to choose RMB as the settlement currency in cross-border trade (Yanfeng L, 2011), which is conducive to saving exchange and risk avoidance costs and enhancing the optimization role of trade path. Some scholars also believe that RMB internationalization will lead to the formation of RMB appreciation expectation(Li and Liu, 2010), while RMB appreciation will slow down the growth of China's export, increase the survival pressure of export-oriented enterprises and be unfavorable to the development of export trade (Ren and Gu, 2017).

The above research shows that, in the context of RMB internationalization, the trade path of wage will change due to the change of exchange rate, but it does not explore the impact of the internationalization measures of RMB. Because of the high trade dependence of China's industrial industry (Yu Wei and Yu Jusong, 2019), the implementation of RMB settlement in cross-border trade, as the starting point of RMB internationalization, is an important way for industrial enterprises to participate in the process. Jing L (2011)also believes that the rise in the proportion of RMB settlement in cross-border trade will help reduce the exchange rate risk of enterprises and facilitate the development of import and export trade. However, the heterogeneity of import and export products, the expectation of exchange rate change, the level of financial development and the introduction of relevant policies are important factors affecting cross-border trade settlement (Liu Qi, 2011; Huo et al., 2018; Wang et al.,2020). The above factors may lead to the change of RMB settlement ratio in cross-border trade, which will indirectly affect the trade path of exchange rate acting on wages. Therefore, it is feasible to study the influence of exchange rate on wages through new trade path, in the case of difficult to obtain cross-border trade settlement data, through the investigation of its influencing factors and taking this as an eye to explore the changes of exchange rate affecting wage path mechanism.

There are many literatures that discuss the influence of exchange rate on wages through trade path, and some have also examined the influence of cross-border trade settlement on trade level, but few literature combines the two research directions. In view of this, the possible contribution of this paper is: (1) In the context of RMB internationalization, from the perspective of exploring the factors affecting cross-border trade settlement, a new trade path of exchange rate affecting wages is derived: net export level trade path, trade path of import and export product structure, currency application and policy change trade path. (2) Considering that the path mechanism becomes relatively complex, the regression analysis adopts the method of progressive regression and reverse verification, and calculates the exchange rate elasticity of industry wages to explore the mechanism and effect of RMB exchange rate change on industrial industry wages through the new trade path under the background of cross-border trade settlement. (3)On the basis of investigating the impact of the RMB exchange rate on the overall wages of the industrial industry, considering that the "the Belt and Road" construction is conducive to the use of settlement tools in the import and export trade of various industries to improve the RMB settlement level,

And the development of cross-border trade settlement business in my country's industrial industry has unbalanced nature, therefore, with the "the Belt and Road" construction as the background, the main industry characteristics are selected to classify the industries, in order to explore the differential impact of exchange rates on different industries, and the role of industry characteristics in the formation of wage return differences between industries.

THE THEORETICAL MODEL

Based on the model ofCampa andGoldberg(2001), this paper reconstructs the general equilibrium model of labor market under the background of RMB internationalization, and then deduces a new trade path of exchange rate changes affecting wages.

The Construction of General Equilibrium Model of Labor Market under the Background of RMB Internationalization

Exchange Rate Changes and Equilibrated Labor Demand

Suppose that the factors invested in the production process by the representative producers pursuing profit-maximizing in a country's specific industry are as follows: domestic labor L_t,domestic capital and other domestic inputs Z_t, and imported productive inputs Z_t^*. Respective factor prices in domestic currency units are denoted by:w_t, s_t and $e_t s_t^*$, and e_t are exchange rates, defined as the domestic currency per unit of foreign exchange. The producer's labor demand adjustment cost is recorded as $c\left(\dot{L}_t\right)=\frac{b}{2}\dot{L}_t^{\,2}$, where $\dot{L}_t$ is the change in labor demand, and b is the coefficient reflecting the adjustment cost of the labor demand. Suppose that the producer sales in the home market q_t, and sales in the foreign market q_t^*. As a function of sales volume, price should satisfy the following conditions: $p_t(q_t)=a_t q_t^{-1/\eta_t}$, $p_t^*(q_t^*)=a_t^* q_t^{*-1/\eta_t^*}$,wherein the parameters η_t and η_t^* are, respectively, the domestic and foreign product demand elasticities facing producers in their industries. Besides,α_t and α_t^* are coefficients of price functions at home and abroad.

With the development of cross-border trade RMB settlement business, producers will choose to use RMB as the settlement currency. In this paper, the import and export proportion of cross-border trade RMB settlement is recorded as θ_t and κ_t, which are measured by the proportion of the import (export) amount settled in RMB in the total import (export) amount settled in cross-border trade, and the net income of cross-border trade RMB settlement is recorded as N_t. Within an industry, the producer can choose factor inputs and total output to maximize the profits, π(equation (1)), and the optimization is subject to the constraints (equation(2)) :

$$\pi(e_t)=\max_{Q_t,L_t,Z_t,Z_t^*}\int_0^{+\infty}e^{-rt}\left[p_t(q_t)q_t+e_t p_t^*(q_t^*)q_t^*(1-\kappa_t)+N_t-w_t L_t-s_t Z_t-e_t s_t^* Z_t^*(1-\theta_t)-c\left(\dot{L}_t\right)\right]dt \quad (1)$$

$$s.t.\ Q_t=q_t+q_t^*,\ Q_t=L_t^{\alpha}Z_t^{*\beta}Z_t^{1-\alpha-\beta} \quad (2)$$

Inside, $\gamma$is the interest rate, and the production function of producers is in the form of the Cobb-Douglas production function. And the parameters α, $\beta$and $(1-\alpha-\beta)$respectively represent the levels of domestic labor input, import input, domestic capitaland other domestic input, *(0≤α,β≤1).*To sum up, through a series of derivation, we can get the general expression of equilibrated labor demand when the producer maximizes profits:

$$\hat{L}_t^d=\omega_0+\omega_1\left[\chi_t(1-\kappa_t)-\beta_t(1-\theta_t)\right]\hat{e}_t+\omega_2\hat{s}_t+\omega_3\hat{s}_t^*+\omega_4\hat{w}_t \quad (3)$$

Inside,$\chi_t$and β_t are defined as the export share and import input level, respectively, and "^" indicates that the variable is logarithmic.

Exchange Rate Changes and Equilibrated Labor Supply

Assuming that the labor supply is an increasing function of wages and a decreasing function of the labor income level, the expression of equilibrated labor supply can be obtained:

$$\hat{L}_t^s=\theta_0+\theta_1\hat{w}_t+\theta_2\hat{y}_t \quad (4)$$

Equating equilibrated labor demand (equation(3)) and equilibrated labor supply (equation(4)) and aggregating the representative manufacturers, we can finally get the expression of equilibrating labor wage in the period*t*when the labor market is balanced:

$$\hat{w}_t = \varphi_0 + \varphi_1\left[\chi_t(1-\kappa_t) - \beta_t(1-\theta_t)\right]\hat{e}_t + \varphi_2\hat{s}_t + \varphi_3\hat{s}_t^* + \varphi_4\hat{y}_t \quad (5)$$

Where $\chi_t - \beta_t$ is defined as the net export level. According to equation(5), under the background of RMB internationalization, the implementation of RMB settlement of cross-border trade has changed the original payment and settlement method, and then the path mechanism of exchange rate changes affecting wages has changed,as the exchange rate movements will affect wages through the revised trade path of the net export level $\chi_t(1-\kappa_t)-\beta_t(1-\theta_t)$. The following will explore the influencing factors of cross-border trade settlement as the breakthrough pointand further deduce the exchange rate's trade path affecting wages.

The Expansion of General Equilibrium Model of Labor Market under the Background of RMB Internationalization

Based on the existing research, this paper holds that: firstly, the heterogeneity of China's import and export products determines its market competitiveness, and the expectation of RMB exchange rate rise or depreciation will affect the income or expenditure of foreign trade enterprises. The above two factors will affect the choice of settlement currency and the proportion of RMB settlement. Secondly, the promotion of RMB internationalization and the promotion scope of RMB settlement of cross-border trade will also affect the development of cross-border trade business and the choice of settlement currency by enterprises, and the RMB internationalization index can be used as a comprehensive reflection of the above factors. Finally, we should consider the impact of the changes in China's macroeconomic environment.

To sum up, the heterogeneity of China's import (export) products$tech^{im}$ and $tech^{ex}$, the expectation of RMB exchange rate appreciation (depreciation)exp_t, the RMB internationalization indexrii_t, and the dummy variable representing China's policy changes dum_t are important factors affecting the import and export proportion of RMB settlement in cross-border trade, so make the following assumptions:

$$\kappa_t \propto c_1 tech_t^{ex} + c_2 exp_t + c_3 rii_t + c_4 dum_t \;\&\; \theta_t \propto c_1' tech_t^{im} + c_2 exp_t + c_3 rii_t + c_4 dum_t \quad (6)$$

Therefore, equation (5) can be further arranged as follows:

$$\begin{aligned}\hat{w}_t = {} & \varphi_0 + \varphi_1(\chi_t - \beta_t)\hat{e}_t + \varphi_2\left(\chi_t tech_t^{ex}\right)\hat{e}_t + \varphi_3\left(\beta_t tech_t^{im}\right)\hat{e}_t + \varphi_4\left[(\chi_t - \beta_t)exp_t\right]\hat{e}_t + \\ & \varphi_5\left[(\chi_t - \beta_t)rii_t\right]\hat{e}_t + \varphi_6\left[(\chi_t - \beta_t)dum_t\right]\hat{e}_t + \varphi_7\hat{s}_t + \varphi_8\hat{s}_t^* + \varphi_9\hat{y}_t\end{aligned} \quad (7)$$

From equation (7), we can see that under the background of RMB settlement of cross-border trade, the path of exchange rate changes affecting wages has changed dramatically. The exchange rate will not only play a role in wages through the traditional net export level trade path$\chi_t - \beta_t$, but also through the new trade path of import and export product structure $\chi_t tech_t^{ex} + \beta_t tech_t^{im}$, currency application and policy changes $(\chi_t - \beta_t)exp_t + (\chi_t - \beta_t)rii_t + (\chi_t - \beta_t)dum_t$.

EMPIRICAL DESIGN

Model

In order to investigate the impact of exchange rate changes on wages under the background of cross-border trade settlement, the empirical model is set as follows:

$$\begin{aligned}LnWAGE_{it} = {} & \alpha_0 + \alpha_1(\chi_{it} - \beta_{it})LnREER_{it} + \alpha_2\left(\chi_{it}TECH_{it}^{ex}\right)LnREER_{it} + \alpha_3\left(\beta_{it}TECH_{it}^{im}\right)LnREER_{it} + \\ & \alpha_4\left[(\chi_{it} - \beta_{it})EXP_t\right]LnREER_{it} + \alpha_5\left[(\chi_{it} - \beta_{it})RII_t\right]LnREER_{it} + \alpha_6\left[(\chi_{it} - \beta_{it})DUM_t\right]LnREER_{it} + \\ & \alpha_7 LnINTEREST_t + \alpha_8 LnOILPRICE_t + \alpha_9 LnINCOME_{it} + \alpha_{10} LnSALE_{it} + \alpha_{11} LnMARGIN_{it} + \xi_i + \lambda_t + \mu_{it}\end{aligned} \quad (8)$$

Model(8) is the general form of panel model, where i indicates the industry (i=1,…,39), t indicates the year (t=2000,…,2019), α is the parameter to be estimated, ξ_i is the individual effect, $\lambda_t$is the time effect, $\mu_{it}$is the error term.To linearize the trend of variables and eliminate heteroscedasticity, except forχ,β,$TECH^{im}$,$TECH^{ex}$, EXP, RII, andDUM, the natural logarithm is used for other variables.

Variable Definition

This paper's research sample is 39 industrial industries, and the sample period is from 2000 to 2019.According to the classification of China national economic sectors (GB/T 4574-2017), 39 industrial industries and their two-digit codes are as follows: Coal Mining and Washing Industry (06), Oil and Gas

Mining Industry (07), Ferrous Metal Mining and Dressing Industry (08), Nonferrous Metal Mining and Processing Industry (09), Non-metallic Mining Industry (10), Other Mining Industry (11), Agricultural and Sideline Food Processing Industry (13), Food Manufacturing Industry (14), Beverage Manufacturing Industry (15),Tobacco Products Industry (16), Textile Industry (17), Textile and Clothing Manufacturing Industry (18), Leather, Fur and Their Products Industry (19), Wood Processing and Products Industry (20), Furniture Manufacturing Industry (21), Paper and Paper Products Industry (22), Printing Industry and Recording Media Replication (23), Cultural and Educational Sports Goods Manufacturing Industry (24), Petroleum Processing, Coking and Nuclear Fuel Processing Industry (25),Chemical Raw Materials and Chemical Products Manufacturing Industry(26), Pharmaceutical Manufacturing Industry (27), Chemical Fiber Manufacturing Industry (28), Rubber Products Industry (29), Plastic Products Industry (30), Non-metallic Mineral Products Industry (31), Ferrous Metal Smelting and Rolling Processing Industry (32), Nonferrous Metal Smelting and Rolling Processing Industry (33), Metal Products Industry (34), General Equipment Manufacturing Industry (35) , Special Equipment Manufacturing Industry (36), Transportation Equipment Manufacturing Industry (37), Electrical Machinery and Equipment Manufacturing Industry (39), Communication Equipment, Computer and Other Electronic Equipment Manufacturing Industry (40), Instrument and Instrument Manufacturing Industry (41), Handicraft and Other Manufacturing Industry (42), Waste Resource and Waste Material Recycling and Processing Industry (43), Power and Heat Production and Supply Industry (44), Gas Production and Supply (45), Water Production and Supply (46).

Dependent Variable

Using the annual data, so this paper uses the average wage of each industry to measure wage level $WAGE$, and uses the domestic CPI to adjust the data, all based on 2010.

Independent Variable

Considering the differences among different industries, *REER* is measured by the real effective exchange rate of RMB at the industry level compiled by the Institute of International Monetary Studies (IMI) of the Renmin University of China. The structure and index selection of explanatory variables are as follows:

(1)The interaction term of the RMB exchange rate and traditional trade route, $(\chi - \beta) * REER$.The ratio of export delivery value to the sales output value of 39 industrial enterprises above the scale of the industry is used to measureχ; the ratio of input from foreign countries and total input used in production is used to measure β, and thetotal input is measured by the sum of labor remuneration, investment in renovation and raw material and fuel import. (2)The interaction term of the exchange rate and trade path of import and export product structure,$\left(\chi TECH^{ex} + \beta TECH^{im}\right) * REER$. The import (export) volume of high-tech products in the total import (export) volume of the industry is used to measure $TECH^{im}$ and$TECH^{ex}$[i]. (3)The interaction term of the exchange rate, currency application, and policy change path, $[(\chi - \beta)EXP + (\chi - \beta)RII + \chi - \beta DUM * REER$. The expectation of RMB exchange rate appreciation (depreciation)*EXP* is measured by the ratio of the difference between the one-year NDF exchange rate of RMB in the Hong Kong offshore market (*CNH_ndf*) and the spot exchange rate of RMB in the mainland onshore market (*CNY_spot*) to *CNY_spot.*The index of RMB internationalization compiled by IMI can comprehensively reveal the development trend of RMB as the world currency, so it is used to measure the internationalization index of RMB. Besides, this paper sets a policy dummy variable*DUM*, the value of which during 2000-2009 is 0, during 2010-2019, which is 1.

Control Variable

It can be seen from the theoretical model that interest rate, international crude oil price, and labor income are also the key factors that affect labor prices. Considering that the impact of domestic demand will also impact the labor price of the industrial industry, to select the industry sales volume and cost-plus pricing rate as the control variables. The variables are constructed as follows:

(1)*INTEREST*, interest rate level is measured by the benchmark interest rate of a one-year loan.

(2)*OILPRICE*, international crude oil price level is measured by the average crude oil prices of the three major markets.

(3)*INCOME*, workers' income level is measured by the ratio between the remuneration of workers in the industry and the annual average number of employees.

(4) *SALE*, the sales volume is measured by the sales output value of the industry.

(5) *MARGIN*, the cost-plus pricing rate is measured by the ratio of profits to the cost of industries.
The above price indicators have been adjusted by domestic CPI and PPI, respectively, with 2010 as the base period. The definition and descriptive statistics of variables are shown in Table I.

TableI. Variable design and descriptive statistics

Variable	Variable Name	Variable Symbol	Mean	Sd	Max	Min
Dependent Variable	Wage level	$LnWAGE$	10.1497	0.5821	11.7589	7.2110
Independent Variable	The interaction term of the RMB exchange rate and traditional trade route	$(\chi-\beta)*LnREER$	-1.7195	1.3504	1.1125	-4.5650
	The interaction term of the exchange rate and trade path of import and export product structure	$(\chi TECH^{ex})*LnREER$	0.0474	0.1909	1.4295	0.0000
		$(\beta TECH^{im})*LnREER$	0.1089	0.3168	2.1426	0.0000
	The interaction term of the exchange rate, currency application, and policy change path	$[(\chi-\beta)EXP]*LnREER$	0.0117	0.0606	0.2526	-0.1400
		$[(\chi-\beta)RII]*LnREER$	-1.1883	2.6313	2.6002	-15.5908
		$[(\chi-\beta)DUM]*LnREER$	-0.6681	1.1748	0.8059	-4.4751
Control Variable	Interest	$LnINTEREST$	1.7424	0.0928	2.0109	1.6084
	International crude oil price	$LnOILPRICE$	6.0366	0.3728	6.5512	5.5018
	Income level of workers	$LnINCOME$	10.1628	0.5682	11.7437	8.9115
	The sales volume	$LnSALE$	8.7048	1.6813	11.7182	0.8331
	The cost-plus pricing rate	$LnMARGIN$	1.8446	0.7894	4.6324	-3.2189

Data Sources

This paper's original data is from the China Statistical Yearbook, China Industrial Statistical Yearbook, the Institute of International Currency of the Renmin University of China, General Administration of Customs, International Financial Statistics Database of IMF, UN ComtradeStatistics Satabase, and Wind Database.

RESULTS

The Overall Impact of RMB Exchange Rate Changes on the Wage Level of 39 Industrial Sectors in China

In this paper, the results of theF-test and Hausman test on the model (8) show that the fixed effect model (FE) should be established. Besides, according to the significance of the model, the variables of labor income level are eliminated, and the regression results are shown in Table II. The empirical analysis is completed by Stata15.0.

TableII.The general impact of RMB exchange rate changes on the wage level of China's industry

	FE				FGLS			
	Net export level path	Path of import and export product structure	Monetary application and policy change path	All paths	Net export level path	Path of import and export product structure	Monetary application and policy change path	All paths

$(\chi_{it}-\beta_{it})LnREER_{it}$	-0.0145			-0.0474***	-0.0037			-0.0100
	(0.0173)			(0.0185)	(0.0045)			(0.0076)
$\chi_{it}TECH_{it}^{ex}LnREER_{it}$		0.5532**		0.4305*		0.1553		0.1909**
		(0.2488)		(0.2411)		(0.1637)		(0.0397)
$\beta_{it}TECH_{it}^{im}LnREER_{it}$		0.0753		0.0655		0.0707		0.1111***(
		(0.0653)		(0.0655)		(0.0620)		0.0402)
$(\chi_{it}-\beta_{it})EXP_tLnREER_{it}$			0.0867***	0.0692***			0.0300***	0.0272***
			(0.0245)	(0.0248)			(0.0047)	(0.0061)
$(\chi_{it}-\beta_{it})RII_tLnREER_{it}$			-0.0101	-0.0118*			-0.0022**	-0.0013
			(0.0064)	(0.0064)			(0.0011)	(0.0009)
$(\chi_{it}-\beta_{it})DUM_tLnREER_{it}$			-0.0234**	-0.0332**			-0.0181***	-0.0230***
			(0.0160)	(0.0163)			(0.0030)	(0.0023)
Control variable	Control	Control	Control	Control	Control	Control	Control	Control
Time effect	Control	Control	Control	Control	Control	Control	Control	Control
Industry effect	Control	Control	Control	Control	Control	Control	Control	Control

Notes: the number in ( ) is parameter standard error of the mean, and *, **, and *** indicate passing the significance test of 10%, 5%, and 1%, respectively. The following table is the same.

It can be seen from the above table that the variable coefficient symbols obtained by FE and complete FGLS regression are the same, indicating that the empirical results are robust. Moreover, the coefficient of the policy dummy variable is more significant, which shows that the impact of RMB exchange rate changes on industrial wages before and after the implementation of cross-border trade settlement. Considering that the path mechanism at this time is relatively complex, and the regression coefficient can't accurately reflect the direction of the exchange rate on wages through each path, this paper uses model (9) to measure the exchange rate elasticity of wages:

$$\frac{\partial LnWAGE_{it}}{LnWAGE_{it}}\frac{LnREER_{it}}{\partial LnREER_{it}} = \hat{\alpha}_1(\chi_{it}-\beta_{it}) + \hat{\alpha}_2\chi_{it}TECH_{it}^{ex} + \hat{\alpha}_3\beta_{it}TECH_{it}^{im} + \hat{\alpha}_4(\chi_{it}-\beta_{it})EXP_t + \hat{\alpha}_5(\chi_{it}-\beta_{it})RII_t + \hat{\alpha}_6(\chi_{it}-\beta_{it})DUM_t \quad (9)$$

Where $\hat{\alpha}$ is the estimated result of regression parameters. In this paper, we put the estimated results of FE and FGLS regression under all trade paths in Table II into the model (9) to calculate the annual wage exchange rate elasticity of various industries under the two models, and then average the elasticity of different industries in each year, and finally get the calculation results of wage exchange rate elasticity of industrial industry, as shown in Table III:

TableIII. Calculation results of exchange rate elasticity of industrial wages

	FE		FGLS	
	Exchange rate elasticity of wages	Relative influence degree（%）	Exchange rate elasticity of wages	Relative influence degree（%）
Net export level path	-0.0077***	40.10	-0.0059***	43.70
Path of export product structure	0.0045*	23.44	0.0037**	27.41
Path of import product structure	0.0054*	28.13	0.0020	14.82
Monetaryapplication and policy change path	0.0016	8.33	0.0019*	14.07

All paths	0.0038*	100	0.0017	100

It can be seen from Table III that under the FE and FGLS models, through the combined effect of the new and old trade routes, RMB appreciation of 1% can promote the wage growth of the industrial industry by 0.0038% and 0.0017%, respectively. Specifically, through the trade path of the structure of import and export products, the exchange rate has a significant positive impact on wages. Through the export path, the RMB appreciation of 1% can promote the industry wage growth by 0.0045% and 0.0037%, while through the import path, the wage level can be increased by 0.0054% and 0.0020%.

Under the background of cross-border trade settlement implementation, China's export enterprises tend to choose RMB as the settlement currency when RMB appreciation. At this time, if the heterogeneity of industrial export products is enhanced, it means that the export enterprises have a substantial choice of settlement currency, which can increase the proportion of RMB settlement in industrial export trade, which will reduce the production cost and exchange rate risk of enterprises, which may be used to directly increase employees' labor wage, or expand reproduction to increase labor demand, and indirectly increase the labor price level. Through similar analysis, it can be concluded that if the heterogeneity of China's industrial import products is enhanced, the proportion of RMB settlement in import trade can also be increased, and the industry wage level will be increased, which is consistent with the research conclusion in Table III.

It can also be seen from Table III that through the monetary application and policy change path, the 1% appreciation of RMB can stimulate the wage growth of the industrial industry by 0.0016% and 0.0019%. Since the impact of exchange rate changes on wages through the trade path is through the RMB exchange rate change expectation, RMB internationalization index, and policy dummy variables, and it can be seen from Table II that the regression coefficient of the expected path of the exchange rate change is the most significant, and the coefficient of the other two paths is relatively small, indicating that the positive expectation of the RMB exchange rate has an important impact on the formation of wage path mechanism.

At present, the capital projects in China are not fully open, which makes the exchange rate level of RMB against the US dollar in the mainland onshore and Hong Kong offshore markets different, which may lead to arbitrage. This has an impact on the RMB settlement proportion of industrial industry in China, and thus the role of industry wages cannot be underestimated. If there is a expectation of RMB appreciation in the onshore market, in order to make more RMB assets return to Hong Kong to buy US dollar arbitrage, Hong Kong export enterprises tend to use RMB to settle in trade with the mainland; in order to make more USD return to the mainland for sale and profit, Hong Kong import enterprises prefer to choose USD for settlement. At present, mechanical and electrical products, optical and medical equipment are the main commodities imported and exported to the mainland, with strong heterogeneity of products; while the mainland has a greater trade competitive advantage in the import of labor-intensive products in Hong Kong, which means that both Hong Kong and mainland industrial export enterprises have strong choice of settlement currency. Therefore, when there is expectation of RMB appreciation, the proportion of RMB settlement in the import and export trade in the mainland will be increased, which will greatly reduce the exchange rate risk faced by enterprises, and help to save exchange and risk avoidance costs. This can not only promote representative manufacturers to reduce production costs and improve their operating conditions, and also help the employees' wage level rise; moreover, the manufacturers will increase their salary due to the rising of the collection The RMB with value trend will accumulate more wealth, which will help it expand reproduction and increase labor demand. In the case of labor supply will not increase significantly, it will be conducive to the improvement of labor price level in the industry, which can also verify the conclusion in Table III.

Although the change of RMB exchange rate will bring positive influence on the wages of industrial industry through the application of currency and policy change path, the effect is weak. The reason is that at present, the proportion of RMB settlement in China's industrial trade is rising rapidly. This is beneficial to the prevention and reduction of exchange rate risk in industrial enterprises in China. At the macro level, it can promote the facilitation of trade and investment in the industry, which results in the increasingly small role of exchange rate in the production decision-making and investment and trade decision of the industry, which ultimately leads to the adjustment of the industry's production capacity, the adjustment of labor demand and the labor price caused the change of the exchange rate is becoming weaker and weaker.

It can be seen from Table III that compared with the two new trade routes, the exchange rate change has a greater negative impact on wages through the traditional net export level trade path. The 1% appreciation of RMB will lead to a decrease in industry wages by 0.0077% and 0.0059%. The coefficient of the path in Table II indicates that the wage level of industries with lower net export levels may be more vulnerable to the negative impact of exchange rate changes.

Generally speaking, the industries with low net export level and weak production capacity of intermediate products with high technology content and added value have weak choice of settlement currency. Therefore, RMB appreciation will lead to the decrease of RMB settlement proportion of the industry, which is not conducive to reducing the exchange rate risk exposure of enterprises, which is not conducive to the reduction of production costs and the improvement of business conditions of the industry. In addition, the weak bargaining power of the above industries makes it difficult to pass on the adverse impact of exchange rate changes through price adjustment, which will make the wage level of the industry more vulnerable to the negative impact of exchange rate changes. This can also verify the conclusion in Table III.

In recent years, China's textile and other light industries are transferring to Southeast Asia, South Asia and other places, and the export of traditional "Made in China" products is declining. At the same time, China's policy of expanding the import of industrial products is constantly landing, showing the policy direction of not actively pursuing trade surplus, indicating that the industrial trade surplus has a narrowing trend. This means that under the background of RMB appreciation, the declining trend of RMB settlement proportion in export trade is weakened, and the rising trend in import trade is enhanced, which is conducive to the increase of RMB settlement proportion and the decrease of enterprise exchange rate risk. In addition, the ratio of RMB settlement receipts and payments has increased from 1:9.7 in 2010 to 1:1 in 2019. The good improvement of the "lameness" feature of settlement is also conducive to reducing the exchange rate risk exposure of industrial enterprises. This makes China's industrial trade less affected by the change of exchange rate, resulting in the exchange rate playing a smaller and smaller role in the adjustment of industrial production capacity, the adjustment of labor demand and the resulting changes in labor price.

The Heterogeneous Impact of RMB Exchange Rate Changes on Wage Levels of 39 Industries in China
The Selection of Industry Characteristics, Classification Methods and Data Sources

Industry characteristics are the primary attributes of industry structure in a certain period, reflecting the basic situation and development trend of the industry. The selection of industry characteristics is as follows: (1) Monopoly characteristics include ownership monopoly, economic monopoly, and the nature of business activities, whichare measured by the proportion of state-owned and state-owned holding units in the industry, the average annual growth rate of units in the industry and the proportion of employment of non-profit-making units. (2) Technical characteristics include average education level, professional and technical level,and factor density. The first two technical characteristics are measured by the average years of education and the proportion of professional and technical personnel. And the classification method of resource-intensive degree is adopted in the classification of factor intensity. (3)Market characteristics include profitability, growth rate, and market power, measured by theoperating margin, per capita capital growth rate, and the ratio ofprofits to cost,respectively. (4)Tradecharacteristics include foreign trade dependence, trade orientation, and trade mode, which are measured by the proportion of the sum of export delivery value and import input in the total output value, export share, and import input level, as well as the proportion of import of raw materials, fuels and other raw materials in import input.

In this paper, the median classification method is used to classify the industrial industry. A certain classification index of 39 industries from 2000 to 2019 is calculated. The average value of the classification index of each industry in 18 years is calculated, and the median of 39 mean values is calculated. If the average value of an industry index is greater than the median, it belongs to a high-level industry; otherwise, it belongs to a low-level industry. This section uses panel data of 24 new industries from 2000 to 2019 for research. The classification results are shown in Table IV. Data sources are the same as above.

TableIV.Results of 39 industrial sectors classified by industry characteristics

Industry characteristics		Measures	Classification level	Code of industry segments included
Monopoly characteristics	Ownership monopoly	Proportion of state-owned holding units	Low	13,17,18,19,20,21,22,24,28,29,30,31,32,34,35,39,40,42,43
			High	06,07,08,09,10,11,14,15,16,23,25,26,27,33,36,37,41,44,45,46
	Economic monopoly	Average annual growth rate of units in the industry	Low	06,07,11,23,24,25,28,31,32,33,36,37,39,40,41,44,45,46
			High	08,09,10,13,14,15,16,17,18,19,20,21,22,26,27,29,30,34,35,42,43
	The nature	Proportion of	Operating	06,07,08,09,10,11,14,15,16,19,23,26,27,29,30,31,35,36,

	of business activities	employment in nonbusiness units		37,41,44
			Non-operating	13,17,18,20,21,22,24,25,28,32,33,34,39,40,42,43,45,46
Technical characteristics	Average education level	Average years of education	Low	06,08,09,10,11,15,16,17,18,19,20,21,22,23,24,25,28,29,30,31,42,43,44,45,46
			High	07,13,14,26,27,32,33,34,35,36,37,39,40,41
	Professional and technical level	The proportion of professional and technical personnel	Low	06,07,08,09,10,11,13,14,15,16,17,18,19,20,21,22,23,24,28,42,43,44,45,46
			High	25,26,27,29,30,31,32,33,34,35,36,37,39,40,41
	Factor density	Resource intensity	Resource and labor intensive	06,07,08,09,10,11,13,14,15,16,17,18,19,20,21,22,23,29,30,31,34,43,44,45,46
			Capital technology intensive	24,25,26,27,28,32,33,35,36,37,39,40,41,42
Market characteristics	Profitability	Operating margin	Low	13,17,18,20,21,22,24,25,28,29,30,32,33,34,39,40,42,43,45,46
			High	06,07,08,09,10,11,14,15,16,19,23,26,27,31,35,36,37,41,44
	Growth rate	Per capita capital growth rate	Low	07,13,14,17,19,20,21,22,23,25,27,28,29,30,33,34,37,39,40,41,45
			High	06,08,09,10,11,15,16,18,24,26,31,32,35,36,42,43,44,46
	Market power	Ratio of profits to cost	Low	17,18,19,20,21,22,24,25,28,29,30,34,40,41,42,43,45,46
			High	06,07,08,09,10,11,13,14,15,16,23,26,27,31,32,33,35,36,37,39,44
Trade characteristics	Foreign trade dependence	Proportion of the sum of export delivery value and import input in total output value	Low	06,11,13,14,15,16,20,22,23,27,28,31,32,33,35,36,37,43,44,46
			High	07,08,09,10,17,18,19,21,24,25,26,29,30,34,39,40,41,42,45
	Trade orientation	Export share and import input level	Import	06,07,08,09,10,11,22,25,26,32,33,37,39,40,41,42,43,45
			Export	13,14,15,16,17,18,19,20,21,23,24,27,28,29,30,31,34,35,36,44,46
	Trade mode	Proportion of import of raw materials, fuels, otherrawmaterials in import input	General trade	06,11,13,14,15,16,18,20,21,22,23,27,28,31,32,34,35,36,37,44,45,46
			Processing trade	07,08,09,10,17,19,24,25,26,29,30,33,39,40,41,42,43

FGLS Estimation Results Considering Industry Heterogeneity

The regression results of the comprehensive FGLS model are shown in Tables V and VI. Limited by space, this section only reports the exchange rate elasticity of wages in different industries under different paths. Moreover, in addition to the difference in wage exchange rate elasticity, we also use a t-test to explore the wage gap between industries.

TableV. The heterogeneousimpact of RMB exchange rate changes on wage in different industries (classified by monopoly and technical characteristics)

	Monopoly characteristics			Technical characteristics	
Ownership	Economic	The nature of	Average	Professional	Factor density

	monopoly		monopoly		business activities		education level		and technical level			
	Low	High	Low	High	Operating	Non-operating	Low	High	Low	High	Resource andlabor-intensive	Capital technology-intensive
Net export level path	-0.0119***	-0.0031***	0.0050***	-0.0048***	0.0089***	-0.0051***	0.0023	-0.0027	0.0033*	-0.0136***	0.0029***	-0.0088**
Pathof export product structure	-0.0017***	-0.0012**	-0.0024***	-0.0008***	-0.0026***	-0.0012***	0	-0.0038***	0	-0.0073***	0	-0.0050***
Pathof import product structure	-0.0020**	-0.0017***	-0.0061***	-0.0013***	-0.0073***	0.0001	0	-0.0052***	0	-0.0030***	0	-0.0070***
Monetary application and policy change path	0.0008	0.0038***	0.0026	0.0005**	0.0027	0.0008**	0.0019	0.0002***	0.0029	0.0002***	0.0030	-0.0005***
All paths	-0.0148	-0.0022**	-0.0009	-0.0064**	0.0017	-0.0054	0.0042	-0.0115	0.0062	-0.0237***	0.0059	-0.0213**
T-test	-5.8681***		4.1478***		4.4782***		-2.7836***		-2.1206**		-1.8217*	

It can be seen from Table V that through the level of net exports and the structural trade path of import and export products, the change of exchange rate will have a significant negative impact on the wages of industrial industries classified by monopoly characteristics. However, through the trade path of currency application and policy changes, RMB appreciation of 1% can increase the wage level of industries with higher monopoly degree by 0.0038%, 0.0005%, and 0.0008%, which are greater than those of the control group, which means that the higher the degree of monopoly, the more significant the role of exchange rate changes in promoting wage growth. This shows that a monopoly is a significant factor in the wage gap between industries, and the t-test results also verify this conclusion.

Through the net export level and the structure trade path of import and export products, the impact of the exchange rate change on the wage level of industries with higher monopoly degrees is relatively weak. The reason lies in that the industrial industries with a higher degree of domestic ownership monopoly have strong independent pricing power, and their stable operating conditions make the labor price stable for a period which to a certain extent causes wage rigidity in the industry. The industries with a high degree of economic monopoly are mainly the infrastructure construction industry of a country. The products are not traded, so the exchange rate will not significantly impact its wage level.

However, through the currency application and policy change trade path, RMB appreciation has a more significant driving effect on the wage growth of industrial industries with a higher degree of ownership monopoly. This may be because RMB appreciation can enhance investors' confidence in holding currency and promote the development of the RMB settlement business. For industries with a high degree of ownership monopoly, given their "state-holding" nature, their response to national policies such as cross-border trade settlement business may be more positive. Therefore, RMB appreciation can promote industries with a high degree of ownership monopoly to actively carry out cross-border trade RMB settlement business. According to the above analysis, it is conducive to the improvement of the labor price level in the industry.

It can also be seen from Table V that through the path of net export level and import and export product structure, the change of exchange rate will have a significant negative impact on the wages of capital and technology-intensive industries with higher education level and technical level, but the positive effect on the wages of the control group is not apparent. Taking the path of net export level as an example, 1% devaluation of RMB can stimulate the wage growth of the above industries by 0.0027%, 0.0136%, and 0.0088%, which are higher than those of the control industries by 0.0023%, 0.0033%, and 0.0029%,

respectively. Through the monetary applicationand policy change path,we can also draw similar conclusions. This shows that technical characteristics are also the decisive factor of wage return differences among industries.

In recent years, the export proportion of China's industrial primary products has been declining, and the share of manufactured goods has continued to rise. However, some vital intermediate products and core technologies still need to be imported, indicating that the heterogeneity of imported products is still substantial. If the technical content of China's industrial export products is high, it will increase the relative demand for a high-quality labor force; conversely, it will increase the relative demand for ordinary labor force or low-quality labor force. Therefore, under the background of RMB appreciation and industrial trade surplus narrowing, the slowdown of industrial export trade and the increase of import input level will not be conducive to the rise in labor demand in the capital and technology-intensive industries with higher education level and technical level, but the continuous growth of labor supply will eventually lead to the decline of labor price in the industry; similar analysis shows that the labor price of the control group industries will rise, resulting in differences in the impact of exchange rate on the wage level of industries with different technical characteristics through the net export level and the trade path of import and export product structure.

In addition, through the trade path of monetary application and policy changes, exchange rate changes can have a significant impact on the wages of high skilled industries, but the impact is weak. The possible reason is that in recent years, affected by the changes and restructuring of the global division of labor system, as well as the import barriers of high-tech products in the Sino US trade war, China's high-tech industries still focus on the production and export of resource-based primary products in the global value chain, with less participation in high value-added links such as R & D and marketing.

This will result in that under different circumstances of exchange rate changes, high-tech export enterprises do not have a strong choice of settlement currency, resulting in a low proportion of RMB settlement in cross-border export trade, and a large amount of foreign currency export income will occupy the RMB settlement space of import trade, resulting in sluggish development of RMB settlement business in the industry, which is not conducive to the improvement of the business situation of representative manufacturers It is beneficial to the accumulation of wealth, which is not conducive to the improvement of labor price in the industry.

TableVI. The heterogeneousimpact of RMB exchange rate changes on wage in different industries (classification by market and trade characteristics)

	Market characteristics						Trade characteristics					
	Growth rate		Profitability		Market power		Foreign trade dependence		ade orientation		Trade mode	
	Low	High	Low	High	Low	High	Low	High	Import	Export	General trade	Processing trade
Net export level path	-0.0075***	-0.0056***	-0.0068***	-0.0124***	-0.0055***	0.0032***	-0.0022*	0.0035***	0.0004	-0.0169***	0.0115*	0.0019***
Path of export product structure	-0.0021***	-0.0037***	-0.0031***	-0.0012***	-0.0039***	0.0001	0.0012*	0.0038***	0.0020***	0.0040***	0.0039***	0.0015***
Path of import product structure	-0.0044***	-0.0017***	-0.0013	-0.0011***	-0.0009*	-0.0022***	0.0027***	0.0017***	0.0020	0.0010***	0.0017***	0.0021***
Monetary application and policy	0.0018	-0.0036***	0.0008	-0.0042***	0.0014	-0.0042***	0.0035	-0.0016***	0.0030***	0.0006***	0.0058***	-0.0004***

change path											
All paths	-0.0122	-0.0146**	-0.0104	-0.0189**	-0.0089	-0.0031	0.0052	0.0074**	0.0074	-0.0113**	0.0229*	0.0051**
T-test	-0.7400		-1.4864		-2.9064***		1.3887		3.0829***		0.5280	

It can be seen from Table VI that through the net export level trade path, RMB exchange rate change has a more significant impact on the wage level of industrial industries with high dependence on foreign trade, export-oriented, and general trade;through the path of export product structure, the effect of exchange rate changes on the wages of the above industries is also more significant than that of the control industries, which is opposite to that of the import products structure path;however, the direction and effect of the exchange rate on industries' wages with different market characteristics are uncertain. In contrast, through the monetary application and policy changes path, the impact of exchange rate changes on the wage level of industries with faster growth rate, more robust profitability, and greater market power is greater than that of the control industry. Still, the direction and effect of the impact on the wages of industries with different trade characteristics are uncertain. This shows that the exchange rate processaffecting wages, market, and trade characteristics can only play a significant role in the specific trade path, and the t-test also verifies this conclusion.

In the process of exchange rate affecting industrial wages through the trade path of import and export product structure, trade characteristics are the significant factors causing the wage gap between industries.

This may be because the industries with high dependence on foreign trade, export-oriented, and general trade are mainly laborintensive and capitalintensive industries with insufficient product processing depth and low added value, which means that the heterogeneity of export products is weak. Under the background of RMB appreciation, the slight enhancement of product heterogeneity may help the representative firms to improve their operating conditions and increase their wealth accumulation, thus promoting the rise of the labor price level. The wage growth will exceed that of the control industries with high heterogeneity of export products. However, the control group of the above industries is mainly the capital technology-intensive industries with high product technology content, which means that the slightly enhanced heterogeneity of imported products may greatly enhance the discourse power of foreign export enterprises in choosing settlement currency. RMB appreciation is still conducive to the improvement of the RMB settlement level, and it will also drive the industry wage growth, which will surpass that of the control industry with high heterogeneity of imported products.

In the process of the exchange rate influencing industrial wages through currency application and policy changes, market characteristics are very important. The reason is that according to the classification results in Table IV, the industries with a faster growth rate, more robust profitability, and greater market power are still dominated by traditional resource and labor-intensive industries. Their foreign trade dependence is relatively high. It means that when the internationalization level of RMB is improved, or the cross-border trade settlement policy is issued, the RMB settlement business of cross-border trade may first be greatly expanded in the above industries, which can promote the rapid improvement of the RMB settlement level of the industry.According to the above analysis, it can eventually promote the rise of the labor price level and lead to the difference in wage returns in the industry.

The Heterogeneous Influence of RMBExchange Rate Changes on Wages in 39 Industrial Industries under the Background of "the Belt and Road"

Selection, Classification Methods and Data Sources of Industry Characteristics under the Background of "the Belt and Road" Construction

As the development of cross-border trade settlement business in various industries is unbalanced, this section also takes "the Belt and Road" construction as the backgroundand selects the new industry characteristics to classify the industry. The process is as follows: (1) The trade characteristics are examined from the perspective of trade level and trade source, which is measured by the bilateral trade volume of China and 65 countries[ii] (regions) along the line in the economic and trade cooperation of various industries and the ratio of the bilateral trade volume[iii] between Chinaand Asian and European countries along "the Belt and Road" in the economic and trade cooperation of various industries. (2) The selection of standardization features considers that industry standards have become a higher form of competition beyond product and

brand competition.The characteristics of standardization [iv] are measured by the number of national (international) standards developed and implemented in various industries.

This section adopts the median classification method. The process of classifying industrial sectors according to the level of trade and the degree of standardization can be referred to above. For trade origin characteristics, the average value of the industry characteristic classification index is greater than the median, which means that the industry has close trade with Asian countries along the line, and the remaining industries frequently trade with European countries. This section uses the panel data of six industries obtained from the new classification from 2000 to 2019 for research. The classification results are shown in Table VII. Data sources are the same as above.

TableVII. Results of 39 industrial sectors classified according to industry characteristics under the background of the " the Belt and Road " construction

Industry characteristics		Measures	Classification level	Code of industry segments included
Trade characteristics	Trade level	Bilateral trade volume between China and countries (regions) along the belt and road	Low	06,11,15,16,19,20,21,22,23,24,27, 28,29,30,32,42,43,44,45,46
			High	07,08,09,10,13,14,17,18,25,26, 31,33,34,35,36,37,39,40,41
	Trade source	Ratio of the bilateral trade volume between China and Asianand European countries along the belt and road	Asiancountries along the belt and road	06,07,09,17,22,23,24,25,26,27,28,29, 30,32,35,37,39,40,41,44,45,46
			European countries along the belt and road	08,10,11,13,14,15,16,18,19, 20,21,31,33,34,36,42,43
Standardization features	Degree of standardization	Number of national (International) standards developed and implemented	Low	06,07,08,09,10,11,15,16,18,19,21, 23,24,27,28,31,42,43,45,46
			High	13,14,17,20,22,25,26,29,30,32, 33,34,35,36,37,39,40,41,44

FGLS Estimation Results Considering Industry Heterogeneity

This section still uses the comprehensive FGLS model for regression; the results are shown in Table VIII, where only reports the exchange rate elasticity of wages in various industries.

TableVIII. The heterogeneousimpact of RMB exchange rate changes on wage in different industries under the background of "the Belt and Road" construction

	Trade level		Trade source		Degree of standardization	
	Low	High	Asian countries along the belt and road	European countries along the belt and road	Low	High
Net export level path	-0.0039***	-0.0083***	-0.0060***	-0.0023***	-0.0046***	-0.0071***
Path of export product structure	0.0048***	0.0006**	0.0008**	0.0044***	0	0.0028***
Path of import product structure	0.0025**	0.0005**	0.0021***	0.0001	0	0.0014***

Monetary application and policy change path	-0.0001	0.0003	0.0037***	-0.0007**	-0.0005**	0.0040***
All paths	-0.0033	-0.0069	0.0006**	0.0015	-0.0051	0.0011***
T-test	-0.8892		3.5127***		-0.0290	

It can be seen from Table VIII that through the net export level trade path, RMB depreciation of 1% can increase the wage level of industries with frequent trade with Asian countries along the line by 0.0060%, which is greater than 0.0023% of the control group. Through the path of export product structure, RMB appreciation of 1% can increase the wage level of industries with frequent trade with European countries along the routeby 0.0044%, which is greater than 0.0008% of the control group industry. However, it is opposite to that of the import products structure path.Besides, through the application of currency and policy changes in trade path, RMB appreciation of 1% can promote the wage level of industries with close trade relations with Asian countries along with the line increase by 0.0037%, which is greater than 0.0007% of the control group. Therefore, whether through traditional or new trade routes, trade origin characteristics can have a significant impact on the wage gap between industries t-test also verifies this conclusion.

In China's trade with Southeast Asia and South Asia along the route, there is little difference in the heterogeneity of import and export products. However, the technical content of China's industrial products imported from Western Europe and central Europe along the route is relatively high. In contrast, the level of heterogeneity of export products is low. Therefore, when the heterogeneity level of China's import and export of industrial products to countries along with the line increases, it will enhance the choice of settlement currency for export enterprises and weaken the discourse power of import enterprises. The appreciation of RMB is conducive to the increase of RMB settlement proportion.

According to the above analysis, it will be conducive to the improvement of the industry wage level. Similarly, with the increasing heterogeneity of industrial products exported to Europe, it will be conducive to a substantial increase in the proportion of domestic currency settlement and the growth of industry wages; however, with the further improvement of the heterogeneity of imported industrial products in Europe, the discourse power of import enterprises will not be weakened too much. The driving effect of RMB appreciation on wage growth will not be too significant, resulting in the difference of the impact of exchange rate on the wages of industries with different trade sources through the structural path of import and export products.

It can also be seen from Table VIII that through the path of net export level, 1% depreciation of RMB can stimulate the wage growth of industries with higher trade level and standardization degree by 0.0083% and 0.0071%, which are greater than those of the control group of 0.0039% and 0.0046%. Through the path of import and export product structure, RMB appreciation of 1% can promote the wages of industries with lower trade level by 0.0048% and 0.0025%, which are higher than those of the control group (0.0006% and 0.0005%); however, it has no significant impact on the wages of industries with lower standardization level. Through the path of currency application and policy change, 1% RMB appreciation can drive the wage growth of industries with a higher degree of standardization by 0.0040%, which is greater than 0.0005% of the control industry; however, the impact on wages of industries with different trade levels is not significant. Therefore, the level of trade and the degree of standardization can only have a decisive impact on the inter-industry wage return differences under the specific trade path.

In the “Belt andRoad Initiative”, China's cooperation with the countries along the line focuses on capital and technology-intensive industries such as power, communications, and transportation equipment, with high international standardization and heterogeneity. Therefore, for such industries, their import and export enterprises have a substantial choice of settlement currency. According to the above analysis, it will be conducive to the wage growth of the industry, resulting in the greater impact of exchange rate on the wages of industries with a higher degree of standardization through the monetary application and policy change path, and lead to the difference of wage returns among industries.

Robustness Checks

With the deepening of the internationalization of RMB, the construction of the RMB offshore market continues to develop, so this paper uses the spot exchange rates of RMB in onshore and offshore markets (CNY and CNH) to calculate the real exchange rate of RMB. Some scholars have found that the overall trend

of exchange rate changes is consistent with the long-term trend of exchange rate changes. Therefore, this paper also uses the long-term trend extracted by the Hodrick-Prescott filtering method as the final exchange rate index to replace model (8)and still uses FE and FGLS models for regression. The results are shown in models 1 and 3 in Table IX. Simultaneously, considering that the electricity, gas, and water production and supply industries do not participate in trade, the exchange rate may not have a significant impact on their wage level. Therefore, the industry is excluded fromthe regression. The results are shown in models 2 and 4.

TableIX. **A robust test of the impact of RMB exchange rate changes onthe overall wage level of China's industrial sectors**

	FE		FGLS	
	Model 1	Model 2	Model 3	Model 4
$(\chi_{it} - \beta_{it})LnRER_{lt}$	-0.0503**	-0.0565***	-0.0129	-0.0071
	(0.0411)	(0.0187)	(0.0165)	(0.0049)
$\chi_{it}DIFF_{it}^{ex}LnRER_{lt}$	0.4633*	0.4445*	0.1820**	0.2117**
	(0.2773)	(0.2411)	(0.0815)	(0.1300)
$\beta_{it}DIFF_{it}^{im}LnRER_{lt}$	0.0504	0.0696	0.1284**	0.0964
	(0.1394)	(0.0654)	(0.0971)	(0.0469)
$(\chi_{it} - \beta_{it})EXP_tLnRER_{lt}$	0.0684***	0.0604**	0.0311***	0.0361***
	(0.0534)	(0.0251)	(0.0137)	(0.0080)
$(\chi_{it} - \beta_{it})RII_tLnRER_{lt}$	-0.0200*	-0.0139**	-0.0015	-0.0013
	(0.0156)	(0.0065)	(0.0023)	(0.0019)
$(\chi_{it} - \beta_{it})DUM_tLnRER_{lt}$	-0.0405*	-0.0388**	-0.0347***	-0.0311***
	(0.0383)	(0.0166)	(0.0054)	(0.0045)
Control variable	Control	Control	Control	Control
Time effect	Control	Control	Control	Control
Industry effect	Control	Control	Control	Control

It can be seen from Table IX that the regression results obtained by panel regression after the replacement of indicators are the same as the original regression results. Except for the differences in the coefficient values of variables, there are no key differences, indicating that the analysis results are robust and reliable.

CONCLUSION

Under the background of cross-border trade settlement implementation, this paper constructs a general equilibrium model of the labor market, deduces a new trade path of exchange rate changes affecting wages, and does corresponding empirical research. The main conclusions are as follows:

First,in the process of RMB exchange rate changes affecting the overall wage level of the industrial industry, the negative impact generated by the trade path of the net export level is the most significant. Still, with the narrowing of industrial trade surplus and the improvement of the "lameness" of RMB settlement, the above negative impact will be weakened. The trade path through the structure of import and export products can play a positive role. Because the heterogeneity of import and export products is the primary factor affecting the level of cross-border trade settlement, under a specific trend of exchange rate changes, it will have a substantial impact on the proportion of RMB settlement in the industry. Then it will play a vital role in the exchange rate risk of the enterprise and the wage level of the industry. Therefore, the impact of this path is expected to be more significant. Although the positive expectation of the RMB exchange rate has an important impact on the formation of the wage path mechanism, with the improvement of the RMB internationalization level and the introduction of cross-border trade settlement policy, the effect of currency application and policy change path will be significantly weakened.

Second,in the process of exchange rate changes affecting wage levels in different industries, traditional trade path or new trade path,monopoly and technology characteristics,the trade source characteristics under the background of “the Belt and Road” are the significant factors causing the wage gap between industries.

Finally, under the background of cross-border trade settlement, the root cause of the differences in the impact of RMB exchange rate changes on wages in different industries is as follows:the differences of import and export commodity structure and product heterogeneity in various industries lead to different RMB settlement level of cross-border trade and exchange rate risk of foreign trade enterprises under different

exchange rate changes, which results in the difference of production cost adjustment and labor demand of representative manufacturers in various industries, and finally leads to the gap of labor price level among industries.

NOTES

[i] According to the notice of "classification of high tech industries (manufacturing industry) (2017)" issued by the National Bureau of statistics, and combined with the classification results of 39 industrial industries, this paper divides the manufacturing industry of chemical raw materials and chemical products, pharmaceutical manufacturing, special equipment manufacturing, transportation equipment manufacturing, electrical machinery and equipment manufacturing, communication equipment, computer and other electronic equipment manufacturing, Instrument manufacturing industry is defined as high-tech industry.

[ii] As countries participate in one degree of "the Belt and Road" construction, this section refers to the 65 identified countries (regions) that were initially identified.

[iii] When measuring the trade characteristics, referring to Sheng Bin's SITC3 and industrial industry correspondence table, the SITC Rev3 three digit code product code classification of uncomtrade database according to international trade standards corresponds to the national economic industry classification (GB / t4754-2017).

[iv] When measuring the standardization characteristics, it is necessary to make the first level classification catalogue of ICs international standard classification correspond to the 2017 national economic and industrial classification (GB/T 4754-2017), so as to unify the industrial classification.

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