Proceedings of the 3rd International Conference on Financial Technology and Business Analysis
DOI: 10.54254/2754-1169/2024.23960

International Trade and Wage Inequality

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Abstract: There are increasing concern of the impact of globalization on the issue of wage inequality in developing and developed countries these days. While clearly, from the point of the conventional ideas, those protagonists who believe that globalization has contributed to the declining wage inequality may be fanatical. However, more and more findings show that this type of thinking could be problematic, and the opposite explanations has become more and more popular as the times has changed. This article constructs a game model between employees and business owners in the context of globalization to study the overall impact of international trade on wage inequality, and this theoretical divergence is also partly due to policy reform and technological change.

Keywords: International trade, Wage inequality, Skill premium, Game

1. Introduction

In the operation of the national economy, trade and wages are important economic indicators of economic growth and income distribution. Clarifying how trade liberalization affects wage changes and distribution has important practical value for promoting world trade development, optimizing industrial structure, and deepening supply side reform. At the same time, wages are the theoretical research core of international trade, macroeconomics, and labor economics.

Driven by the expansion of high-level opening-up to the outside world, foreign trade economic activities such as intermediate goods trade, service trade, digital trade, and cross-border e-commerce exports will further improve their quality and efficiency. How the labor market evolves and how labor wages change in this context will become a key focus of attention in the process of global economic growth. Looking back at the development path since globalization, especially after emerging economies such as China joined the WTO, with the rapid growth of global trade, accelerated evolution of international division of labor, profound changes in the world economic structure, the labor market and wage levels in China and around the world have undergone earth shattering changes.[1] In recent years, there have been significant changes in the wage levels of manufacturing labor in various countries, not only reflected in the rapid growth of overall labor wage levels, but also in the continuous evolution of wage gaps within the labor market.[2] So, how does trade openness affect wage changes in enterprises? How do micro mechanisms work? What direction will the research on international trade and wages develop towards? Therefore, this article will start from international trade theory, sort out important research on international trade theory and wages, clarify the development of research on international trade and wage gap, and review and prospect the research on international trade and wage gap. In order to assist policy-making and implementation departments

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DOI: 10.54254/2754-1169/2024.23960

in better coordinating income distribution policies with trade policies and industrial policies, and fully realizing the process of expanding trade benefits and wage equality in opening up to the outside world.

The remaining part of this article is structured as follows: first, an introduction to the theory of trade and wages, then a theoretical explanation of skill premiums, followed by an analysis of wage inequality in the process of globalization based on game models, and finally, conclusions and policy recommendations

2. Theories of trade and wages

One of the well-known models in trade theories is the Heckscher-Ohlin (HO) model of international trade. It states that two countries will specialize and trade with each other based on the differences in factor endowments. Countries will export goods and services in which use their abundant factors, whereas countries will import goods and services in which that use their scarce factors in light of the prediction of the HO model.

Based on the findings of the HO model, the Stolper-Samuelson theory suggests that when the price of a good produced using an intensive factor increases, the real return to this factor increases as well. However, the real return to the other factor decreases, given that the model was established on a two-sector and two-factor framework (labor, capital).

According to the Heckscher-Ohlin model, countries will tend to export goods and services in which they can be produced using abundant factors, developing countries will export more labor-intensive products by trade liberalization as they have more unskilled workers. Meanwhile, they will import more skill-intensive products, which increases the demand of unskilled workers and reduces the demand of skilled workers. As a result, the wage gap in developing countries to be improved as there are higher wages for unskilled workers and lower wages for skilled workers.

In terms of developed countries, the prediction of the theory tends to go to the contrary. As those developing countries benefit from the economies of scale, these labor-intensive products can be exported cheaply, and therefore the theory predicts that wages of unskilled workers in developed countries will fall while the wages of skilled workers will rise.

However, the proposal of the so-called “New trade theory” these days overturns a series of assumptions of the traditional models. Focusing on the facts of economies of scale, network effects and first-mover advantage, this model can also be used to explain the relation between international trade and inequality. In the case of imperfect competition and increasing returns to scale, countries that are identical in economic development will specialize in producing differentiated products and therefore trade with each other.

If a country takes the first-mover advantage in those technological industries, it will gain monopoly power in these industries. Meanwhile, the cost of production of these products are relatively low due to the effects of economies of scale. More relevant industries and firms will congregate in this country in search of cost efficiencies and scale advantages, following this trend, an increasing number of skilled workers are needed to keep them operated well, skill premium is higher in this type of country and the wage gap between skilled and unskilled labor therefore increases. The overall result of the analysis shows a trend of rising inequality between skilled and unskilled labor, which contradicts the prediction of the conventional models.

3. Theoretical explanations for the increase in the skill premium

According to the prediction of the Stolper-Samuelson model, labor reallocation will occur within countries. In fact, Goldberg and Pavcnik analyzed the impact of trade reform (trade liberalization) on labor reallocation, they found that the effect is hard to witness, the rigidity of their labor markets and imperfection of product markets are the main reasons for the constrained cross-sectoral reallocation

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of labor. [3] Besides, Goldberg and Pavcnik showed that the share of skilled workers has increased in most industries in developing countries.

There are three possible explanations for the fact according to Goldberg and Samuelson. The basic 2x2 HO model may be extended to a more complicated 3x3 model, for instance, by introducing sectors like non-traded goods and factors like land. If the new model is based on the assumption that the countries are abundant in lands and lands and skilled workers are complements, trade liberalization will benefit the skilled workers, identical logical reasoning can be applied to non-traded goods. Secondly, following the step of trade reforms, large reductions in tariff are applied to unskilled labor-intensive sectors. Although the unskilled once protected by the governments for various reasons, the demands as well as wages now for them falls. Thirdly, the increment in the volume of exports from LDCs to middle-income countries will lead to the reductions in the amount of goods and services produced domestically, resulting in a decrement of demands for the unskilled workers and hence increases the wage gap between low-skill and high-skill workers. [4]

3.1. Explanation from the new trade theory

In light of the general prediction of the New Trade model mentioned in the section 1, Paul Krugman shows that a localized concentration of scale-intensive industries in particular regions is common under the circumstances of external economies of scales. Krugman also states that the cluster effects increase in step with the expansion of regional industrialized centers, tend to provide cost advantages compared to others. Even more, the advantages and efficiencies in scales and costs are enhanced by the higher wages paid to workers and the effects of technological spillovers.[5]

In order to reveal the micro mechanism of the "wage premium" generated by trade openness, some scholars have conducted research from the perspectives of labor education level and enterprise human capital stock. Scholars have used Danish FIDA microdata to explain the "wage premium" of export enterprises from the perspectives of the education level of labor force and the stock of human capital in enterprises. However, it is worth noting that due to the existence of competitive effects, exports have a relatively weak negative impact on enterprise wages; The force that triggers the "wage premium" effect by increasing the wages of export enterprises is the increase in the stock of human capital in the enterprise. [6] In export competition, enterprises cope with fierce market competition by hiring highly skilled labor to produce differentiated products, which means that the "wage premium" caused by exports only exists in technology intensive industries. [7] In addition, trade openness promotes export companies to obtain higher wage premiums through various mechanisms, including hiring more skilled workers, using more advanced machinery, purchasing higher quality material inputs, and having higher productivity than non-export companies, all of which can lead to export companies having wage premiums.[8] Based on extensive research, if we change the theoretical assumptions about the heterogeneity of technology, trade costs, and types of hired workers in enterprises, we use structural equation modeling to characterize the theoretical mechanism of the relationship between international trade and enterprise wages, and derive the theoretical mechanism of reducing trade frictions, promoting an increase in wage premiums for high skilled workers, and a decrease in wage premiums for medium skilled workers.[9]

3.2. Explanation from the firm heterogeneity

Classic theories have mainly explained the relationship between international trade and wage inequality through price levels in product markets, supply and demand in labor markets, and productivity changes brought about by technological progress. The product price information brought about by trade openness is transmitted to the production sector, which affects the decision-making of the production sector and causes the labor market to make new responses to changes in the demand

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for skilled and unskilled workers (in both trade and non-trade sectors), leading to asymmetric changes in labor prices and wages, and thus causing changes in the level of wage gap between skilled and unskilled workers. In addition, technological progress will change the level of labor productivity and product functionality, causing changes in the labor market and product market, which will change the level of wage gap in the country through price transmission mechanisms.[10] The theory of heterogeneous trade in enterprises mainly discusses the impact of trade openness on wage inequality from the perspectives of enterprise performance (such as productivity, profits, and income) and enterprise behavior (such as entry or exit decisions and output decisions). Compared with neoclassical trade theory, firm heterogeneity trade theory has a good micro foundation in explaining the relationship between international trade and wage inequality, freeing itself from the limitations of only classifying capital intensive and labor-intensive production sectors at the macro level. For example, research on the trade-wage theory model enriches the connotation of firm heterogeneity characteristics to study the impact mechanism of firm's trade openness on wage inequality, and uses employers and employees data from Brazilian firms to test the model.[11] Ultimately, it is found that trade openness has a nonlinear effect of widening and then narrowing the wage gap. Moreover, with the development of heterogeneity theory in enterprises, discussions on wage gaps can delve into both the enterprise level within the industry and the level of different skilled labor, revealing the true relationship and logic between international trade and wage inequality. [12]

4. Model and results

4.1. Model

We have constructed a model that includes both business owners and heterogeneous labor force. In this model, the production function of the business owner's enterprise is in the form of CD, with the main inputs being high skilled human capital and low skilled human capital. [1] Setting developing countries as full employment and developed countries as full employment. Specifically, set the production function as:

$$Y = A_i H^{0.5} L^{0.5}$$

Among them, Y, A, H, and L are output, total factor productivity, high skilled labor input, and low skilled labor input, respectively. In order to simplify the analysis, the product price is standardized to 1, and the skill premium of developed countries is reflected in the total factor productivity higher than that of developing countries, with A values of 10 and 5 for developed and developing countries, respectively. Assuming that the labor structures of developing and developed countries have a ratio of H to L of 1:3 and 2:2, respectively, and that all high skilled labor and most low skilled labor permanently participate in production, in other words, we judge the wage premium and wage income gap in the process of globalization by the game between whether the last low skilled labor in the economy participates in work and whether business owners participate in globalization. In order to facilitate the smooth development of this game in different markets, we further supplement the setting by setting the wage of high skilled labor worldwide $w_H = 2$, the wage of low skilled labor worldwide $w_L = 1$, and the wage reserve price for workers in developed countries to 0.5, which means that workers can receive a 0.5 relief benefit after unemployment. Due to the existence of union power in developed countries, it is assumed that union workers can collude to share wages and benefits. In other words, due to the insufficient employment in developed countries, employees can contribute the same amount of labor and receive benefits under the premise of less employment. Therefore, the average income of employees is the average of the sum of benefits and wages. In addition,

[1] https://www.gov.cn/xinwen/2018-04/18/content_5284032.htm

DOI: 10.54254/2754-1169/2024.23960

globalization has led to a 10% increase in both corporate income and worker's income. After simple calculations, the income matrix for the bottom low skilled labor force and employers in developing and developed countries facing globalization can be obtained as follows:

Table 1: Globalization benefit matrix

<table>
<tr><td></td><td colspan="4">EMPLOYER</td></tr>
<tr><td rowspan="8">Low skilled labor force</td><td colspan="4">Panel A: developing countries</td></tr>
<tr><td>A(1.1,11)</td><td>B(1,10)</td><td colspan="2">Game results</td></tr>
<tr><td>C(0,10.4)</td><td>D(0,8)</td><td colspan="2">A</td></tr>
<tr><td colspan="4">Panel B: developed countries</td></tr>
<tr><td>E(1,11)</td><td>F(1,10)</td><td colspan="2">Game results</td></tr>
<tr><td>G(1.3,11)</td><td>H(1.2,10)</td><td colspan="2">G</td></tr>
<tr><td colspan="2">Average skill premium in A: 1→1.1</td><td colspan="2">Average skill premium in B: 1→1.3</td></tr>
</table>

4.2. Results

Observing the results of the game in different countries, it can be found that in developing countries and developed countries, A and G are their own dominant strategies, and by choosing this strategy, business owners and low-skilled labor can each achieve the maximum allocation of profits or wages, in addition, it is not difficult to find that the results of the game are all business owners participate in globalization, and the difference is whether low-skilled labor participates in work. Looking at the last row of Table 1, we can see that the results of this game directly lead to, for example, the unemployment rate of low-skilled labor in developed countries and the increase in the cost of benefits; Moreover, the skill wage premium in developed countries is higher than that in developing countries.

4.3. Reasonability of estimated results

Trade reform further embedding the country into the global value chain division of labor may lead to a significant widening of the wage gap between skilled and unskilled workers, but this change is not accompanied by significant changes in relative employment. This article further relaxes this assumption. Compared with existing research, it can be seen that the widening wage gap is not significantly correlated with relative price changes and skill intensity, but mainly related to changes within industries and factories. In addition, foreign-funded enterprises and export enterprises are more inclined to pay higher returns for skilled workers, and technological changes have to some extent explained the phenomenon of higher returns for skilled workers.[13] However, the widening wage gap is not solely due to the reduction of tariffs or quotas. The main conclusion of this article is that wage differentials in developed countries are more affected by globalization because of differences in skill premiums, trade union power, and social welfare, therefore the estimation result has a certain degree of rationality.

5. Conclusion and policy implications

Trade liberalization will bring about the redistribution of income among different groups. Understanding which groups are more affected by the process of trade liberalization can help governments formulate corresponding income redistribution policies to reduce the adjustment costs brought about by trade liberalization. This article constructs a game model between employees and business owners, examining the impact of participating in global trade on the relative growth of regional wages, and thus exploring the income distribution effect in the process of trade liberalization

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from the perspective of skill premiums. The research results indicate that, by opting for these strategies, they can achieve the optimal distribution of profits or wages. Furthermore, it is clear that the game results in business owners engaging in globalization, with the key distinction being the participation of low-skilled labor in the workforce. And it becomes apparent that the outcomes of this game of employers and employees have direct implications, such as the unemployment rate among low-skilled labor in developed countries and the escalation of benefit costs. Additionally, it is noted that the skill wage premium in developed countries is higher compared to that in developing countries.

Based on the above conclusions, this article proposes the following policy recommendations. Firstly, pay attention to the income redistribution of specific affected groups. At present, some countries are decoupling from globalization, while others are further integrating into the global order. This article finds that low skilled workers in developed countries are most severely impacted by globalization. Therefore, in the process of further reducing tariffs and promoting trade openness in emerging economies, the interests of these groups pointed out in this article should be fully considered and compensated through appropriate redistribution policies. Secondly, promote cross regional labor mobility and reduce the adjustment costs of trade. We found that the income distribution effect of trade is reflected at the regional level, which means that the flow of labor between regions is not sufficient, making it impossible for labor to reduce the impact of trade by migrating to other regions when it is negatively impacted by trade. Therefore, relaxing restrictions on labor mobility and accelerating the flow of labor between regions play an important role in reducing the adjustment costs brought about by trade liberalization and further promoting opening up to the outside world.

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