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TRADE LIBERALIZATION, STRUCTURAL CHANGE AND PRODUCTIVITY GROWTH: EVIDENCE FROM MONGOLIA

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ABSTRACT

We analyze how Mongolia's trade openness affects labor market structural changes and its contribution to manufacturing productivity growth. Our findings indicate that reducing import tariffs on intermediate goods resulted in a 1.70% shift of labor from state-owned enterprises (SOEs) to non-SOEs from 2001 to 2015, accounting for 2.96% of intra-industry labor flow. Intermediate import tariff reduction decreased costs for non-SOEs and alleviated financing constraints. Additionally, the shift in employment ownership due to trade openness improved resource allocation efficiency, explaining 3.51% of production efficiency growth from inter-enterprise factor allocation and 0.81%-1.12% of overall manufacturing productivity growth. This highlights its role as a key channel for enhancing productivity through trade openness.

KEYWORDS

Trade Openness, Import Tariff, Structure Change, Productivity Growth, Mongolia

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1. Introduction

Over the past three decades, the world has witnessed an increase in the trade globalization. Many countries including Mongolia experienced a rapid increase in international trade. Mongolia's economy has been greatly affected by international trade, particularly since it transitioned to a market economy in the early 1990s and joined the World Trade Organization (WTO) in 1997.

Privatization of state properties played important role in Mongolia’s transition to democracy from communism and economic reform from centralized economy to market economy. By 1989, the government owned 96 percent of total assets and properties of the country. Less than 2 per cent of the properties considered as private properties. The rest belonged to communes of farmers, which operated directly under the government control. In the end of 1990, Privatization Commission of Mongolia drafted a Law on Privatization of Properties and the parliament adopted it in May 1991. At the same time a Law on Commercial Entities was enabled. An amendment to Civil Code guaranteed a right for people to own unlimited amount of private assets and properties. The first time in more than a half century, Mongolian people were given an opportunity to establish and operate their own commercial entities (Marshall et al., 2007). The privatization of the state-owned enterprises (SOEs) was regarded as “the center of the reform program” and many senior government officials regarded this as the most important achievement of the reform process (Jermakowicz & Kozarzewski, 1996). Privatization process involved the transformation of low productivity SOEs into non-state-owned enterprises

(non-SOEs), fostering greater competition and efficiency within the market. Consequently, a significant shift of labor from SOEs to non-SOEs occurred.

Mongolia's WTO accession has led to gradual tariff reductions, enhancing domestic resource allocation and diversifying imports in imperfectly competitive sectors. Additionally, under Mongolia's Law on Competition in 2010, Mongolia removed import restrictions and reduced import tariffs. According to Statistics Mongolia, the value of the Mongolian imports increased significantly from 0.83 billion USD in 2001 to become 5.28 billion USD in 2015. During that period, 7.06% of Mongolia's employment was in the manufacturing sector, but this indicator has been increasing year by year, and the number of people working in the manufacturing sector has been increasing. Additionally, the total factor productivity (TFP) of manufacturing enterprises has grown rapidly, increasing by an average of 6.14% annually.

What factors, beyond the visible reform of SOEs, have influenced the shift in the ownership structure of manufacturing employment in Mongolia? How does the change in employment structure contribute to the growth of total factor productivity for enterprises? This paper focuses on how trade openness has transformed the employment structure within Mongolia's manufacturing sector and assesses its contribution to productivity growth. It aims to provide new theoretical insights and empirical evidence on the effects of trade openness on domestic economic development.

This paper is directly related to the growing research on the regional labor market effects of trade expansion in recent years. Numerous studies have found that trade openness has a significant impact on employment rates and wages in the labor market (Autor et al., 2013; Dauth et al., 2014; Holappa, 2022; Pierce & Schott, 2016; Topalova, 2010), wage and income inequality (Agustina, 2018; Balsvik et al., 2015; Donoso et al., 2015; Topalova, 2010) and human capital investment decisions (Atkin, 2016). This paper is also closely related to the research on the relationship between trade openness and enterprise productivity in the field of international trade. Previous papers have mostly focused on the impact of trade liberalization on internal productivity of enterprises (Amiti & Konings, 2007), neglecting the impact of optimized allocation of factor resources among enterprises caused by trade expansion on overall productivity. Individual literature, such as Melitz (2003; Pavcnik, 2002), found that trade openness promotes the transfer of labor factor resources from low-productivity enterprises to high-productivity enterprises, and improves overall productivity. Among them, McCaig & Pavcnik, (2018) are the most closely related to this paper. Based on Melitz (2003) theoretical model, that paper found that Vietnam's export expansion led to a significant shift of labor from the informal sector to the formal sector, resulting in an overall productivity increase of 1.50% to 2.80% in the manufacturing sector through this channel.

Compared with the above papers, the main contribution of this paper is: first, quantitatively identifying the impact of trade openness on the flow of labor across ownership sectors in specific industries, providing new empirical evidence for studying the relationship between trade openness and employment structure changes; second, to gain a new understanding of the economic mechanisms through which trade openness affects ownership employment structure, this paper explores how trade openness affects employment structure through intermediate goods inputs and financing constraints (FCs); third, it reveals that trade openness is one of the channels that affect the total factor productivity of the manufacturing sector, namely the ownership structure change of employment, which provides a useful supplement to the literature on the relationship between trade liberalization and enterprise productivity; forth, by leveraging the impact of trade openness, the contribution of cross-sectoral labor mobility to overall productivity growth has been accurately identified, providing new empirical evidence for studying the contribution of factor allocation efficiency to productivity growth.

The remainder of this paper is structured as follows. Section 2 presents three important characteristic facts about the ownership structure changes of employment in Mongolia's manufacturing sector. Section 3 describes the empirical approach and the data. Section 4 presents our estimation results, robustness test, and mechanism analysis. Finally, section 5 concludes.

2. Characteristic fact of Mongolia

This chapter is based on product import and export tariff data and data from the National Statistics Office of Mongolia (NSO) enterprise data, three key facts about trade openness, structural changes in employment, and total factor productivity in the manufacturing sector are classified.

Fact 1: Over the past three decades, Mongolia has had sustained economic growth, labor productivity has increased, and a significant number of jobs have been created. Structural changes that mark a modernizing economy have been progressing-urbanization has increased substantially while an increasing number of workers has moved out of agriculture and into industry, especially manufacturing sector. From 2001 to 2015,

employment in the non-SOEs manufacturing sector continued to grow, and changes in the ownership structure of employment were mainly intra-industry. As shown in Figure 1, during this period, the employment rate of SOEs in the manufacturing sector decreased from 72.81% to 12.06%, resulting in a total decrease of 60.75%. The employment rate of non-SOEs in the manufacturing sector increased from 27.19% to 87.94%. The decrease in the employment rate of SOEs is due to the following two channels: i) Change of intra-industry. Since 1992, the privatization work has continued until now. In recent years, due to various factors such as years of losses and weak asset management, some SOEs have undergone restructuring and privatization. Therefore, the increase in the labor force in non-SOEs is reflected in the intra-industry distribution of labor force. ii) Change of inter-industry. The shift of labor from industries with a high proportion of SOEs to industries with a low proportion of SOEs has led to a decline in the proportion of employed people in SOEs. Therefore, this paper further divides the ownership structure change into intra-industry flow and inter-industry flow. Figure 1 shows that out of the 60.75% decrease in the proportion of employed population in SOEs from 2001 to 2015, 51.48% of the decrease occurred intra-industry, accounting for approximately 84.74% of the decrease in the proportion of employed population in SOEs; the 9.27% decrease in proportion occurred inter-industry, accounting for approximately 15.26% of the decrease in the proportion of employment in SOEs. It can be seen that the decline in employment in SOEs is mainly due to more labor entering non-SOEs intra-industry. Therefore, this paper mainly focuses on the cross-sectoral allocation effect of labor intra-industry.

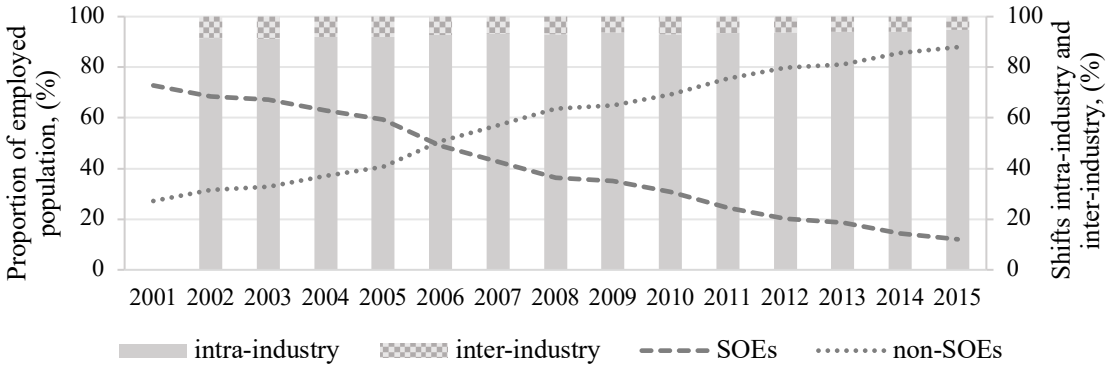

Fig. 1: Share of employment in manufacturing sector.
Source: National Statistics Office of Mongolia.

Fact 2: The degree of trade openness measured by the decrease in import tariffs on intermediate goods is closely related to changes in the ownership structure of employment. The deeper the degree of industry trade openness, the lower the proportion of employment in SOEs. Figure 2 shows that within the sample interval, industries with a greater decrease in import tariffs on intermediate goods have a greater decrease in the proportion of SOEs employees. The decrease in import tariffs on intermediate goods is significantly positively correlated with the decrease in the proportion of SOEs employment. With the continuous deepening of Mongolia's trade opening process, the proportion of employment in non-SOEs are constantly increasing.

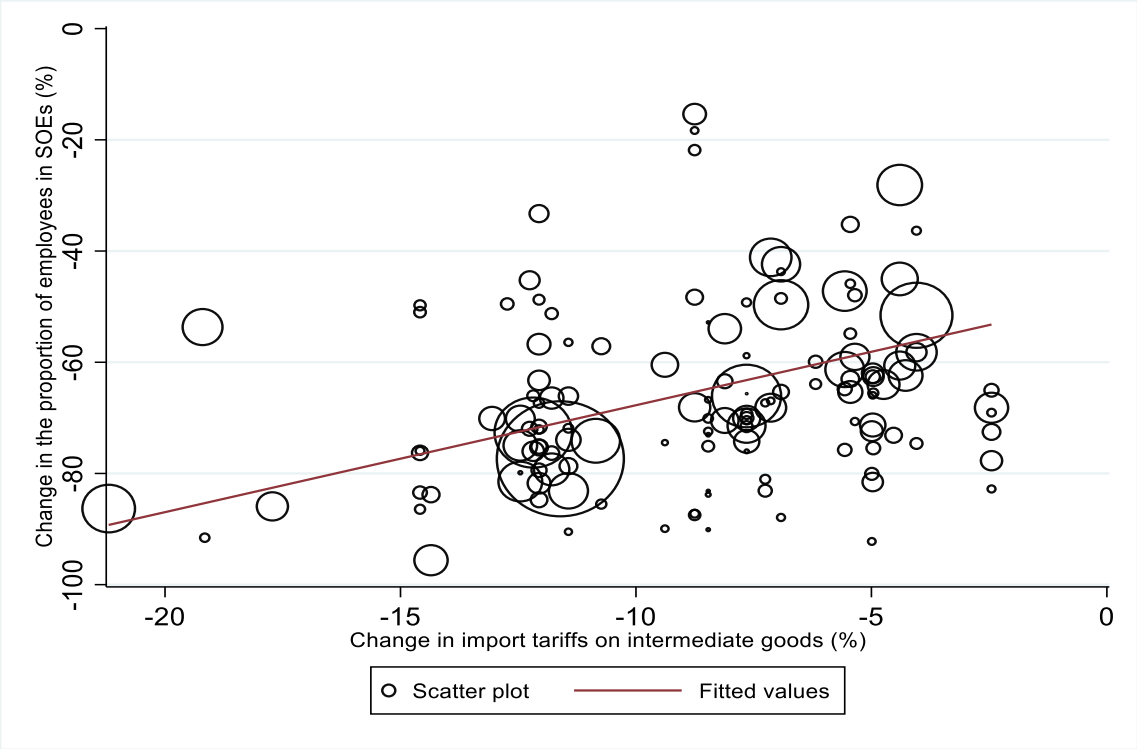

Fig. 2. Import tariffs on intermediate goods and employment in SOEs.
Source: National Statistics Office of Mongolia.

Fact 3: In the manufacturing sector, it was discovered that the average total factor productivity of SOEs was lower than that of non-SOEs between 2001 and 2015. The share of cross-sectoral labor mobility intra-industry contributing to overall TFP growth over the data interval was 33.83%, which is an important source of TFP growth. Figure 3 shows the average TFP calculated using the weighted employment population for SOEs and non-SOEs from 2001 to 2015. It can be seen that, on the one hand, the average TFP of both SOEs and non-SOEs has been increasing; on the other hand, the TFP of SOEs has been lower than that of non-SOEs. This means that the flow of labor from SOEs with low TFP to non-SOEs with high TFP can increase overall productivity.

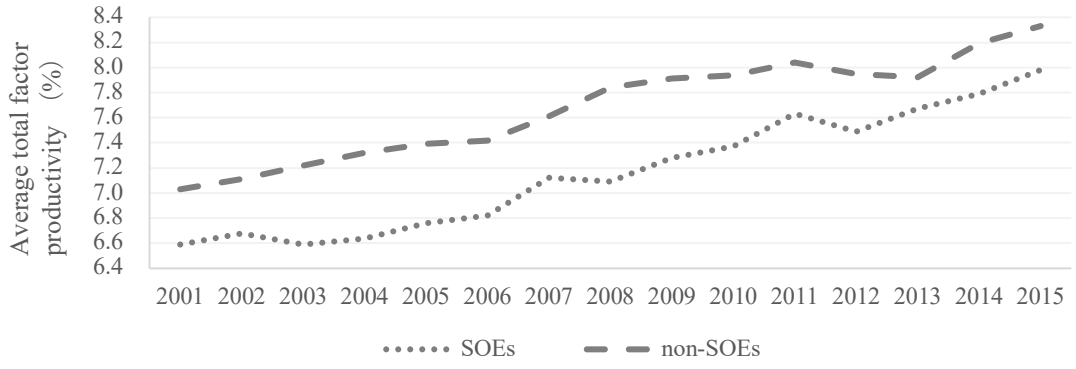

Fig. 3. Average total factor productivity of SOEs and non-SOEs.
Source: National Statistics Office of Mongolia.

Summarizing the above three characteristic facts, this paper argues that trade openness has accelerated the change in the employment structure of Mongolia's manufacturing sector. It has prompted labor to be reallocated intra-industry inter-sectoral, thereby increasing the productivity of the manufacturing sector as a whole. This paper next empirically examines the impact of trade openness on the change in the ownership

structure of employment, and on this basis measures the impact of intra-industry inter-sectoral labor factor allocation on TFP growth in the manufacturing sector.

3. Empirical Approach

3.1. Industry-level Regression

This paper estimates the effect of declining import tariffs on intermediate goods on intra-industry employment structure changes at the industry-level. The employment structure change that this paper focuses on mainly refers to the labor mobility in the same industry and among different sectors of ownership. The regression model is set as follows:

$$SOE(rate)_{jt} = \alpha + \beta_1 tariff_{jt-1} + X_{jt}\gamma + \delta_j + \varphi_t + \varepsilon_{jt} \quad (1)$$

Where, $SOE(rate)_{jt}$ represents the proportion of employment in SOEs within the four-digit industry level j during period t. The decrease in $SOE(rate)$ means a decrease in the proportion of employment in SOEs and an increase in the proportion of employment in non-SOEs, reflecting the process of continuous redistribution of labor factors between SOEs and non-SOEs (i.e. intra-industry cross-sectoral allocation of labor factor). The explanatory variable $tariff_{t-1}$ represents the import tariff on intermediate goods in industry j in period $t-1$. The use of changes in import tariffs of intermediate goods with one-period lagged intra-industry, can effectively identify the impact of trade openness on intra-industry cross-sectoral allocation labor. X_{jt} represents industry-level control variables, which include: i) one-period lagged import and export tariffs on final goods to control for the effect of expansion in imports and exports of final goods on the results; ii) total employment in industry j at the beginning of the period and interaction terms of time, gross value added of industry j at the beginning of the period and interaction terms of time, are included to control for industry beginning characteristics, to mitigate the impact of pre-trends. In model, X_{jt} also includes interaction fixed effects between the two-digit industry level and interaction terms of time, as well as the logarithm of the average wage per capita in the industry. δ_j and φ_t represents industry and time fixed effects, respectively, to control for the impact of heterogeneity and time trends at the four-digit industry level that do not change over time. ε_{jt} is the error term. β represents the parameter of interest. If the reduction in import tariffs on intermediate goods leads to a shift of labor from SOEs to non-SOEs intra-industry, then $\beta > 0$.

3.2. Enterprise-level Regression

Following the approach as Bloom et al. (2016), this paper examines the effects of reduced import tariffs on intermediate goods on labor mobility between ownership sectors at the enterprise-level. The regression model is specified as follows:

$$Ln(emp)_{ijt} = \alpha_0 + \beta_1 tariff_{jt-1} + \beta_2 soe_{ijt} + \beta_3 soe \times tariff_{jt-1} + D_{ijt}\theta + X_{jt}\gamma + \delta_i + \varphi_t + \varepsilon_{ijt} \quad (2)$$

Where, $Ln(emp)_{ijt}$ represents the logarithm of the employment of enterprise i in industry j in period t; $tariff_{jt-1}$ is the import tariff of intermediate goods in industry j in period $t-1$; soe_{ijt} represents whether enterprise i in industry j in period t is a SOEs. D_{ijt} represents feature variable of enterprise i in industry j during period t, including the logarithm of the current main business income of enterprise i, the logarithm of enterprise age, the logarithm of per capita capital of enterprise, enterprise feature variables such as whether the enterprise exports. In model settings, this paper also controls for the industry level control variable X_{jt} and the logarithm of per capita wages in enterprises. δ_i and φ_t represent enterprise and time fixed effects, respectively, and ε_{ijt} is the error term. In this paper, the standard errors of the estimated coefficients in the enterprise-level regression are clustered to the four-digit industry and time levels.

3.3. Data

In this paper, the quantitative data of Labor Force Survey data and Mongolian industrial enterprises of 2001-2015 of National Statistics Office of Mongolia (NSO) and the import and export tariff data of 2000-2014 goods of World Integrated Trade Solution (WITS) were used. The data of Mongolia's industrial enterprises cover all SOEs and non-SOEs. Our empirical test follow the approach of Amiti & Konings (2007) . To process samples: i) The original sample of Mongolian industrial enterprise data from 2001 to 2015 was subjected to panel data integration and duplicate value deletion to obtain a manufacturing sector sample containing 12784 observations. ii) The annual industry output and input deflator are used to deflate the average annual net value of fixed assets, total output, industrial added value, enterprise intermediate goods input, main business income and other nominal variables involved in this paper to get the real value. iii) Samples with 5 variables missing or less than or equal to 0, including total output, industrial added value, intermediate input, average annual net value of fixed assets and main business income, are excluded, while samples with enterprise employment less than 4 are excluded. Finally, this paper matches the data of Mongolian industrial enterprises database with the import and export tariff data of products, and obtains the benchmark sample, which contains 306 enterprises and 7210 observed values. In regression, this paper further deleted the samples of foreign-funded enterprises, and obtained 6885 observed values.

Enterprise ownership. Using the two variables of enterprise registration type and registered capital, this paper defines the ownership type of enterprises as SOEs (including locally owned enterprises), non-SOEs (private enterprises) and foreign-funded enterprises. In regression, this paper defined soe=1 if the enterprise is a SOEs, and soe=0 if the enterprise is a non-SOEs.

Cross-sectoral allocation of labor factors. In regression, combining with the Mongolian industrial enterprises database, this paper uses two indicators to measure the cross-sectoral allocation of labor factors from the industry-level and the enterprise-level respectively: i) the proportion of SOEs in intra-industry. ii) the logarithm of the number of employees employed by the enterprises. It is worth noting that the cross-sectoral allocation of labor factors defined in this paper is the overall effect of the reallocation of existing labor and the initial allocation of new labor. It is a process of continuous redistribution of labor factors among different ownership sectors in the overall labor market.

Productivity measurement. This paper uses the method of Ackerberg et al. (2015) to estimate the TFP of Mongolian manufacturing enterprises from 2001 to 2015. Due to differences in production technology among different industries, this paper estimates the TFP of enterprises by two-digit industry level. Overall average productivity of manufacture that is the weighted average of individual enterprise productivity: $TFP_t = \sum_{i=1} s_{it} TFP_{it}$, where, s_{it} is the weight, expressed as the proportion of employment in enterprises i.

Import tariffs on intermediate goods. Consistent with Amiti & Konings (2007) approach, this paper measures trade openness primarily through tariff reductions on imports of intermediate goods. Using the inter-industry variation in import tariffs on intermediate goods can effectively identify the impact of trade openness on the cross-sectoral allocation of labor. Import data were obtained from the United Nations (UN) Comtrade database at the Harmonized System (HS) six-digit level. Industries are classified at the four-digit level of the Mongolian Standard Industrial Classification (MSIC).

3.4. Descriptive Overview

Table 1 presents the descriptive statistical results of the main variables. It can be seen that the logarithm of the average number of employees in the sample manufacturing enterprises is 4.6309, and the logarithm of the average age of the enterprises is 2.2234. From 2001 to 2015, an average of 41.88% of enterprises were SOEs, and 18.46% of enterprises were export enterprises. At the industry-level, the import tariff for intermediate goods from 2001 to 2015 was 0.1884, slightly lower than the final goods import tariff of 0.2057 and slightly higher than the export tariff of 0.1333.

Table 1. Descriptive statistics

Variables	Mean	Std. dev.	Min	Max	Obs
Panel A: Enterprise-level					
emp_{ijt}	4.6309	1.0801	8.5771	9.7927	6865
$lnrevenue_{ijt}$	16.4398	1.3190	8.5771	23.3377	6865
$klratio_{ijt}$	10.1738	1.2985	2.3144	15.8238	6865
value add_{ijt}	15.1212	1.5293	0.0010	23.1324	6865
$lnage_{ijt}$	2.2234	0.9044	0.0000	4.5218	6865
ef_{ijt}	0.1846	0.3880	0.0000	1.0000	6865
soe_{ijt}	0.4188	0.4934	0.0000	1.0000	6865
TFP_{ijt}	8.9383	1.0530	-1.0432	11.5080	6865
$lnwage_{ijt}$	9.0146	0 .7417	-0.9054	12.6492	5823
Inv_{ijt}	16.1611	1.3771	0.0050	22.3736	5823
FCs_{ijt}	-0.6576	0.0726	-1.0705	1.4258	5823
Panel B: Indusry-level					
$tariff_{jt-1}$	0.1884	0.0551	0.0613	0.3230	676
$output_{jt-1}$	0.2057	0.1025	0.0488	0.5008	676
$export_{jt-1}$	0.1333	0.0730	0.0000	0.8220	676
total $emp_{j,2001}$	10.5252	1.3884	6.6783	14.5908	676
total $val_{j,2001}$	20.9478	1.3708	17.7315	25.0779	676
$soe(rate)_{jt}$	0.5147	0.2992	0.0310	1.0000	676

Source: Author's calculation

4. Result

4.1. Benchmark Regression Results

Table 2 reports the estimated results at the industry-level. In this paper, the industry-level regression is carried out in the four-digit industry level and time dimension. The industry-level regression of this paper is carried out in the four-digit industry level and the interaction terms of time. The standard error of each column coefficient is clustered to the two-digit industry and time level. Column (1) only controls the four-digit industry fixed effect and the year fixed effect. The results show that the industries with the greater the decrease in import tariffs of intermediate goods, the greater the decrease in the proportion of employment in SOEs, and the estimated coefficient is statistically significant at the level of 1%. Column (2) adds the final goods import tariffs and export tariffs one-period lagged, and the coefficient estimate drops slightly to 0.9074.

Table 2. The impact of reduction tariffs on imports of intermediate goods on labor allocation across sectors of ownership: Industry level

	(1)	(2)	(3)	(4)	(5)	(6)
$Tariff_{jt-1}$	1.1250***	0.9074 ***	0.8964***	0.7796***	0.6034***	1.6593***
	(0.3261)	(0.3060)	(0.2573)	(0.2109)	(0.2076)	(0.5827)
$output_{jt-1}$		0.2243***	0.3744***	0.4370***	0.5780***	1.832
		(0.1081)	(0.0824)	(0.0887)	(0.0907)	(0.1667)
$export_{jt-1}$		0.0856	0.0582	-0.1535	-0.0208	0.0376
		(0.1846)	(0.1014)	(0.0842)	(0.0684)	(0.1646)
Controls	No	No	Yes	Yes	Yes	Yes
Per capita wage of industry	No	No	No	No	Yes	No
Two-digit industry × time dummy	No	No	No	Yes	Yes	No
Obs	676	676	676	676	676	676
R-squared	0.9156	0.9163	0.9269	0.9417	0.9542	0.9203

Dependent var. is share of the employed people in SOEs.

Notes: ***,***,* represent the significance level of 1%, 5%, and 10%, and the values in parentheses () represent the robust standard error. Columns (1) - (5) are OLS estimation results, column (6) is IV estimation results.

Source: Author's calculation

As expected, lower import tariffs on final goods also contributed to the cross-sectoral allocation of labor, but the effect of export tariffs is not statistically significant. In column (3), the coefficient drops to 0.8964 after the addition of total employment at the beginning of the period for each industry and the interaction term of time, gross value added at the beginning of the period for each industry and the interaction terms of time. Column (4) controls for two-digit industry level and interaction terms of time effects, the effect of import tariff of intermediate goods on the proportion of employment population in SOEs is still robust, with a coefficient of 0.7796 and statistically significant at 1% level. Wage is an endogenous variable of labor market, which is the result of the equilibrium of labor supply and demand. Considering the impact of wage level on employment, the logarithm of the average per capita wage of the industry is controlled in column (5), and the result is still robust. Following the literature, column (4) is used as a model setting for preference, taking into account the endogeneity of wages. The regression estimates in Table 2 are weighted using total industry employment at the beginning of the period. On the robustness test, the results estimated using instrumental variable (IV) are discussed (column (6) of Table 2).

The results of Table 2 present that the more the import tariffs on intermediate goods decrease, the more the proportion of employed population in SOEs decreases. This means that in the process of trade openness, the reduction of import tariffs on intermediate goods has prompted the transfer of labor factor resources to non-SOEs. In addition, the coefficient of import tariff of final goods is significantly positive, indicating that the import competition of final goods is intensified, and the fiercer market competition also promotes the reduction of staff in SOEs and the improvement of efficiency, and promotes the cross-sectoral allocation of labor factors. When discussing the impact of reduced tariffs on intermediate goods imports on labor mobility across sectors, neglecting the effects of final goods imports can potentially lead to an overestimation of the impact of reduced tariffs on intermediate goods.

Table 3 reports the estimated results at the enterprise-level. The first column only controls for fixed effects of enterprises and fixed effects of years, and the tariff coefficient β_1 is negative, suggesting that the reduction in import tariffs on intermediate goods has incentivized enterprises to increase their labor force; however, this finding is not statistically significant. When after adding the SOEs and intermediate goods import tariffs' interaction terms in column (2), the coefficient on import tariffs on intermediate goods is significantly negative and the coefficient on the interaction term β_3 is significantly positive. In columns (3) and (4), enterprise control variables and industry control variables are added sequentially. The coefficient on tariff remains significantly negative, and the coefficient on interaction term continues to be significantly positive; however, the absolute value of these coefficients decreases. In column (5), per capita wages of enterprises are introduced to account for the impact of wage levels on employment, which still does not change the results of this paper. Due to the strong endogeneity of wages, the model setting in column (4) is preferred in this paper. In column (4), the coefficient for the tariff on imports of intermediate goods is significantly negative, while the coefficient for the interaction term is significantly positive. Notably, the absolute value of the interaction term's coefficient exceeds that of the tariff's coefficient. This finding suggests that a reduction in tariffs on imports of intermediate goods leads to a decrease in employment within SOEs and an increase in employment within non-SOEs. Consequently, labor shifts towards non-SOEs, highlighting the cross-sectoral allocation effect of labor resources. Table 3 presents the results using weights on the ratio of at the beginning of period enterprises hiring to total industry hiring. In the robustness check section, the paper also discusses the results of IV estimation in column (6) of Table 3.

Table 3. The impact of reduction tariffs on imports of intermediate goods and the enterprise ownership structure on employment intra-industry

	(1)	(2)	(3)	(4)	(5)	(6)
$tariff_{jt-1}$	-0.3178	-1.5992***	-1.3674***	-1.3114***	-0.7187***	-1.8915***
	(0.2367)	(0.2612)	(0.2188)	(0.3906)	(0.3278)	(0.3815)
soe		-0.2082***	-0.0841***	-0.0903***	-0.0595***	-0.2289***
		(0.0246)	(0.0212)	(0.0168)	(0.0154)	(0.0239)
$soe \times tariff_{jt-1}$		2.0189***	1.1936***	1.2865***	1.1166***	2.3112***
		(0.1874)	(0.1567)	(0.1408)	(0.1276)	(0.1754)
Enterprise control variable	No	Yes	Yes	Yes	Yes	Yes
Industry control variable	No	No	No	Yes	Yes	Yes
$lnwage_{ijt}$	No	No	No	No	Yes	No
Obs	6729	6729	6729	6729	6729	6729
R-squared	0.9121	0.9238	0.9443	0.9501	0.9576	0.3302

Dependent var. is logarithm of employment in enterprises.
Source: Author's calculation

It is important to note that the decline in the employment ratio of SOEs, as presented in Table 2, may stem from two factors: first, the transfer of surviving labor from SOEs to non-SOEs (labor redistribution); second, the movement of the labor force from the non-manufacturing sector to the manufacturing sector, with a particular emphasis on non-SOEs (initial allocation of new labor). Unfortunately, paper based on enterprise-level data are unable to differentiate between labor redeployment and primary allocation. However, the entry and exit of different types of enterprises can reflect the problems of labor reallocation and initial allocation to a certain extent. Therefore, this paper re-estimated the equation (2) from the enterprises balanced panel data, and found that the coefficient of the import tariff of intermediate goods is significantly negative, while the interaction term of the import tariff of SOEs and intermediate goods is significantly positive. Moreover, the coefficient increases slightly, indicating that the effect of labor reconfiguration is stronger during the sample period.

The results of Table 2 and Table 3 confirm that in the process of trade openness, the decrease of import tariffs on intermediate goods promotes the flow of labor to non-SOEs. According to Figure 3, it can be seen that trade openness leads to the transfer of labor from SOEs with relatively low TFP to non-SOEs with higher TFP, which improves the efficiency of cross-sectoral labor allocation. Given other conditions unchanged, import tariffs on intermediate goods decreased by 2.19% from 2001 to 2015, and the regression results in column (4) of Table 2 presents that the reduction of import tariffs on intermediate goods by 1 percentage point leads to a decline of about 0.7796 percentage points in the employment population of SOEs in the intra-industry. As a result, the reduction in import tariffs on intermediate goods led to the transfer of 1.70 percentage points of the labor force in the intra-industry to non-SOEs from 2001 to 2015.

4.2. Robustness Test

The endogeneity of import tariffs on intermediate goods, the reform of SOEs, changes in the industry to which the enterprises belong over the sample period, the application of industrial value-added weighted regressions, and controlling for the impact of productivity levels on baseline results are discussed sequentially in this section.

Endogeneity of import tariffs on intermediate goods: If the positive correlation between the decline in the employment share of SOEs and the reduction in import tariffs on intermediate goods is due to the government selectively targeting industries with a greater decline in the employment share of SOEs and lowering import tariffs on intermediate goods, then the intermediate goods import tariff indicator may be endogeneous. The results of the endogeneity test confirm that the proportion of employment in SOEs prior to joining the WTO does not significantly affect the changes in import tariffs on intermediate goods after joining the WTO. This finding implies that the changes in tariffs on intermediate goods were not based on the initial employment share within SOEs. Furthermore, during the period from 2000 to 2014, the tariffs on intermediate goods imported by the manufacturing sector decreased significantly, and the industries with higher tariff levels at the beginning of the period experienced a larger decrease. This indicates that industries that were initially protected by trade barriers did not continue to receive trade protection in the process of trade liberalization.

Therefore, this paper believes that the reduction of tariffs on intermediate goods imports is relatively exogenous (Kis-Katos & Sparrow, 2015).

The regression results for IV estimates are shown in Table 2 and Column (6) of Table 3, respectively. It can be seen that the OLS estimates for both the industry-level and enterprise-level regressions are consistent with the IV estimates. This suggests that the reduction in tariffs on intermediate goods has facilitated labor flow across all ownership sectors. The estimated F-statistics in the first stage are all much greater than 10, indicating that the IV constructed in this paper do not suffer from the problem of weak instruments. The absolute values of the IV estimated coefficients are higher than those of OLS, which may be due to the fact that the government's implicit desire to push different industries towards market reform varies. On the one hand, if the proportion of SOEs employment in an industry is higher, the government's willingness to push it towards market reform is stronger, then the missing variable is positively correlated with the dependent variable in this paper. On the other hand, if the government intends to use the competitive effects of openness during market-oriented reforms to support the market process, import tariffs for these industries will fall even lower after trade openness, and the intermediate import tariff variable used in this paper is the market, which is negatively correlated with the missing variable of market-oriented reforms. At this point, the OLS parameter estimates will be underestimated, and the OLS estimates will represent the lower bound of the impact of trade openness on the labor-force structure.

The impact of SOEs reform: In the early 1990s, Mongolia carried out comprehensive and large-scale reforms of SOEs. While it is undeniable that SOEs reform has an impact on changes in employment structure, the main purpose of this paper is to investigate the role of trade openness hidden within SOE reform in changes in employment-ownership structure, and discover its contribution to productivity growth. One of the focuses of SOEs reform is the restructuring of SOEs, specifically transitioning them into non-SOEs. To address potential biases in benchmark results arising from SOEs restructuring, this paper limits the sample to enterprises that maintained consistent ownership from 2001 to 2015 and subsequently re-estimates the benchmark model. Column (1) of Tables 4 and 5 report the results at the industry-level and enterprise-level, respectively. As another important way of SOEs reform is to make small and medium-sized SOEs with difficulties go bankrupt and withdraw from the market, this paper further restricts the sample to enterprises with unchanged enterprise ownership, so as to alleviate the impact of SOEs reform on the benchmark estimation results through this way. This result is the same as the benchmark results, as well as the results in column (1) of Tables 4 and 5. To sum up, because there is no direct correlation between the SOEs reform and the reduction of import tariffs on intermediate goods, and after controlling the two important reform paths of state-owned enterprise restructuring and enterprise exit, the results in Columns (1) and (2) of Table 4 and Table 5 show that the benchmark estimation results are robust, and the SOEs reform is not have a significant impact on the conclusions of this paper.

The impact of a change in the industry to which enterprises belongs can be significant: Enterprises that experience changes in their industry affiliation during the sample period may distort the regression results. To address this issue, the paper excludes this subset of the sample and re-estimates the benchmark model. The findings presented in column (4) of Tables 4 and 5 indicate that the conclusions drawn from this paper remain robust.

Using industry value-added weights: the benchmark results of this paper employ total industry employment and enterprises employment as proportions of overall industry employment. In the robustness test section, the analysis further utilizes industry gross value added and enterprises value added as proportions of total industry gross value added. The findings presented in column (5) of Tables 4 and 5 indicate that the estimation results remain robust throughout this paper.

The impact of productivity levels on the cross-sectoral allocation of labor: The enterprise's own productivity level can also affect its labor demand. Therefore, in column (6) of Table 4, this paper further controls for the average productivity level of the employed population at the beginning of the four-digit industry level and interaction terms of time, in column (6) of Table 5 further controls the one-period lagged productivity level of enterprises to control the impact of differences in enterprise productivity levels on cross-sectoral allocation of labor. The estimation results of this paper is still robust.

Table 4. The impact of reduction import tariffs on the ratio of employment in SOEs: Robustness test at the industry-level

	(1)	(2)	(3)	(4)	(5)	(6)
	Enterprises with unchanged ownership	Enterprises with unchanged and continuing ownership	Sample of joining a foreign-funded enterprises	The sample of joining a foreign-funded enterprises without changing the industry to which it belongs	Value-added weighting by industry	Control productivity level
$tariff_{jt-1}$	0.5084**	0.5183*	0.8821***	1.0104***	0.5195***	0.8478***
	(0.2176)	(0.3041)	(0.2801)	(0.4113)	(0.1781)	(0.2309)
Obs	669	482	502	392	674	674
R-squared	0.9345	0.9136	0.9484	0.9481	0.9469	0.9442

Dependent var. is ratio of employment in SOEs.
Source: Author's calculation

Table 5. The impact of reduction import tariffs on labor mobility across ownership sectors: Robustness test at the enterprise-level

	(1)	(2)	(3)	(4)	(5)	(6)
	Enterprises with unchanged ownership	Enterprises with unchanged and continuing ownership	Sample of joining a foreign-funded enterprises	The sample of joining a foreign-funded enterprises without changing the industry to which it belongs	Value-added weighting by enterprises	Control one-period lagged enterprises productivity
$tariff_{jt-1}$	-3.0926***	-1.7232***	-1.2971***	-0.6304*	-1.0745***	-0.8928**
	(0.3966)	(0.4383)	(0.2498)	(0.3177)	(0.2870)	(0.3958)
soe_{ijt}			-0.1099***	-0.1015***	-0.1195***	0.04793**
			(0.0159)	(0.0176)	(0.0184)	(0.0193)
$soe \times tariff_{ijt-1}$	3.4081***	3.0158***	1.5293***	1.4310***	1.2941***	1.0838***
	(0.2160)	(0.2306)	(0.1096)	(0.1268)	(0.1266)	(0.1382)
Obs	4804	3287	5924	4910	4298	3396
R-squared	0.9418	0.9407	0.9352	0.9423	0.9392	0.9434

Dependent var. is logarithm of employment in enterprises.
Source: Author's calculation

4.3. Mechanism Analysis of The Impact of Trade Openness on Employment Structure

How does trade openness affect the structure of employment and productivity growth? This paper explains the impact of trade openness on the labor employment structure from two perspectives: the reduction of tariffs on intermediate goods, which expands the demand for intermediate goods by non-SOEs, and the alleviation of FCs for these enterprises. Assume that the production of enterprises requires three factors: labor, capital and intermediate goods inputs. Among them, intermediate goods inputs can be purchased from abroad through imports, and enterprises are faced with different capital prices to measure the FCs faced by enterprises. The higher the FCs faced by the enterprises, the higher the corresponding price of capital. Without losing generality, the labor demand function of the enterprise can be expressed as:

$$L_d = \int (A, w, r, p; x)$$

Where, A represents the productivity of the enterprise, w is the market equilibrium wage, r and p are the capital price and intermediate goods price faced by the enterprise respectively, and x is other factors that

are not reflected in the traditional labor demand model but affect the labor demand of the enterprise (such as labor adjustment costs of enterprises, implicit policy constraints). Given x, in the case of complementary input factors (Cobb-Douglas production function and constant elasticity of substitution production function with elasticity of substitution less than 1), the labor demand of the enterprise is a decreasing function of capital price r and intermediate goods price p (when r and p decrease, the demand for capital and intermediate goods increases, and the demand for labor increases), that is:

$$\frac{\partial L_d}{\partial r} < 0, \frac{\partial L_d}{\partial p} < 0$$

And there are:

$$\frac{\partial^2 L_d}{\partial r \partial A} < 0, \frac{\partial^2 L_d}{\partial p \partial A} < 0$$

With the help of the above framework, it can be found that trade openness leads to a shift of labor to non-SOEs through two channels, the direct and the indirect effect. This analytical logic is also consistent with Melitz's (2003) theoretical model: there is heterogeneity among enterprises within the industry, and enterprises with high productivity benefit more from trade openness, thereby expanding production and attracting more labor factors.

The direct effect is as follows: the reduction of import tariffs on intermediate goods reduces the price p of intermediate goods, and enterprises expand production scale by importing cheaper intermediate goods, thus expanding the demand for labor factors. At the same time, because non-SOEs are more productive, they benefit more from falling prices of intermediate goods (increase demand for intermediate goods), and the demand for labor rises faster, thereby shifting workers to non-SOEs.

The indirect effect is as follows: On the one hand, the reduction of import tariffs on intermediate goods improves the production efficiency of enterprises, improves the profits of enterprises, and relieves the endogenous FCs of enterprises (Amiti & Konings, 2007; Yu, 2015); On the other hand, the reduction of import tariffs reduces the cost of enterprises and improves their profits, thus easing their FCs. The above mechanism will eventually reduce the price of enterprise capital r, which is reflected in the reduction of enterprise FCs. And because the productivity level of non-SOEs is higher, their FCs fall more sharply, and labor demand rises faster.

If the above mechanism is established, it can be seen in the empirical study that after the reduction of import tariffs, compared with SOEs, non-SOEs will expand the input of intermediate goods more, and the degree of FCs will decrease more. This paper uses the logarithm of enterprises intermediate goods' investment (Inv) and enterprises financing constraints (FCs) to run regression on intermediate import tariffs and the interaction term of dummy variable of SOEs.

Table 6 presents the results of the mechanism analysis. The results of OLS in column (1) of Table 6 presents that the coefficient of import tariff of intermediate goods is positive but not significant, and the coefficient of interaction term is significantly positive. The IV estimation results in column (2) show that the coefficient on the import tariff on intermediate goods is significantly negative, it suggests that a decline in import tariffs on intermediate goods and a reduction in the cost of intermediate goods during trade liberalization can motivate non-SOEs to use more intermediate inputs. The coefficient of the interaction term is significantly positive, and the absolute value of this coefficient is smaller than that of the tariff coefficient. This indicates that non-SOEs increase their inputs of intermediate goods more than SOEs during the process of trade liberalization, thereby verifying the direct effect mentioned in the mechanism analysis above. Non-SOEs generally face more significant FCs than SOEs. The results in columns (3) and (4) indicate that the reduction in intermediate goods costs during the process of trade liberalization can effectively alleviate the FCs of non-SOEs, prompting them to increase their production capacity, employ more labor, and change the employment structure in the labor market. This verifies the indirect effects mentioned in the mechanism analysis above.

Table 6. The impact of trade openness on the cross-sectoral allocation of labor

	Inv		FCs	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
$tariff_{jt-1}$	0.1128	-0.6167**	0.0517***	0.0819***
	(0.2911)	(0.2399)	(0.0181)	(0.0199)
soe_{ijt}	-0.0203	-0.0498***	0.0054***	0.0112***
	(0.0118)	(0.0153)	(0.0011)	(0.0013)
$soe \times tariff_{ijt-1}$	0.2008*	0.4312***	-0.0584***	-0.1069***
	(0.1018)	(0.1298)	(0.0075)	(0.0095)
First-stage F-statistics		458.1000		458.6630
Obs	6280	6280	5960	5960
R-squared	0.9581	0.6088	0.9343	0.5184

Source: Author's calculation

4.4. Estimation of The Impact of Trade Openness on Productivity Growth

According to the approach of McCaig & Pavcnik (2018), this paper can use an alternative approach to estimate the impact of trade openness on the overall productivity of the manufacturing sector through cross-sectoral mobility of labor. Where, the manufacturing sector is divided into two sectors, SOEs and non-SOEs, and the productivity growth due to cross-sectoral mobility of labor can be expressed as $\Delta P = S_e^{tariff} \Delta p_e$; S_e^{tariff} is the proportion of cross-sectoral mobility of labor due to the decline in tariffs on imports of intermediate goods, and S_e^{tariff} can be obtained by the coefficient estimated in column (4) of Table 2, which is 1.70%. Δp_e is the productivity gap between SOEs and non-SOEs, which is approximated here by average labor productivity. Consistent with the setting of estimating enterprises productivity in this paper, the production function of manufacturing enterprises is set as Cobb-Douglas form: $Y_s = A_s K_s^{\alpha_s} L_s^{1-\alpha_s}$, $s \in \{SOE, non-SOE\}$, where A is the total factor productivity of the two sectors, K is the capital stock, L is the labor input, and $1-\alpha_s$ is the labor input-output elasticity. It follows that:

$$w_s = MRPL_s = (1-\alpha_s) ARPL_s \tag{3}$$

Where, $ARPL_s$ is unit labor output, $MRPL_s$ is marginal income from labor, and w_s is wage level. The difference in labor productivity between SOEs and non-SOEs can be obtained from equation (3):

$$\frac{w_{non-SOE}}{w_{SOE}} = \frac{MRPL_{non-SOE}}{MRPL_{SOE}} = \frac{ARPL_{non-SOE}}{ARPL_{SOE}} \tag{4}$$

Since the wage rate of the labor force cannot be observed in the data, this paper calculates the labor productivity gap between the two sectors using unit labor output according to equation (4). At this point, the impact of trade openness on the overall productivity of the manufacturing sector through the cross-sectoral allocation channel of labor can be calculated by equation (5):

$$\Delta P = S_e^{tariff} \Delta p_e = \frac{S_e^{tariff} (ARPL_{ratio} - 1) ARPL_{SOE}}{(1-s_{SOE}) ARPL_{non-SOE} + s_{SOE} ARPL_{SOE}} \tag{5}$$

Where, S_e^{tariff} represents the proportion of labor flow from SOEs to non-SOEs due to the decline in tariffs on imports of intermediate goods, the estimated coefficients in column (4) of Table 2 give S_e^{tariff} of 1.70% over the period 2001-2015. Since $ARPL_{SOE} = 11933.33$ and $ARPL_{non-SOE} = 188882.12$ at the beginning of the period, there is $ARPL_{ratio} = ARPL_{non-SOE} / ARPL_{SOE} = 1.5823$

$ARPL_{ratio} = ARPL_{non-SOE} / ARPL_{SOE} = 1.5823$. Since $s_{SOE} = 65.28\%$ at the beginning of the period, according to equation (5), it is estimated that the contribution of trade openness to productivity growth through the promotion of cross-sectoral labor allocation channels from 2001 to 2015 was 0.81%, which is consistent with the contribution of 1.12% obtained using productivity decomposition in this paper, indicating the robustness of the conclusion in this paper.

5. Conclusions.

Trade openness has been a significant influence on Mongolia's economic development, affecting its development rate, economic structure, and labor market dynamics. The paper investigates the relationship between trade openness effects on labor market employment structure and enterprise productivity. This paper links trade-induced changes in the structure of employment in the labor market to its impact on enterprises productivity, this paper empirically tests the impact of reducing tariffs on imports of intermediate goods on the change in the ownership structure of employment in the process of trade openness, and estimates the contribution of this channel of action to the overall productivity growth of the manufacturing sector.

The results of this paper not only reveal the typical characteristics and driving forces of Mongolia's labor employment structure change, but also identify the new contribution mechanism of trade openness to enterprises productivity growth. This paper finds that: (1) The main realization of the change in Mongolia's employment ownership structure is intra-industry cross-sectoral labor mobility, while the contribution of inter-industry mobility is small; (2) The decline in import tariffs on intermediate goods induced by trade openness led to 1.70% of labor flow to non-SOEs, which can explain 3.31% of intra-industry cross-sectoral labor mobility in the sample interval; (3) Trade openness affects the employment structure of ownership through two channels: intermediate goods inputs and financing constraints; (4) The share of the improvement in factor allocation efficiency brought about by the intra-industry flow of labor from SOEs to non-SOEs contributes 17.41% to the overall productivity of the industry. The share of contribution of trade openness to overall productivity growth in manufacturing sector through this channel of action is 0.81%-1.12%.

This paper identifies the cross-sectoral allocation of labor facilitated by trade openness as a crucial link and mechanism that significantly contributes to the overall growth of TFP. It serves as an important complement to existing research on the impact of trade openness on productivity growth. Furthermore, this study provides a novel perspective and analytical framework for understanding the dynamic evolution of productivity within Mongolia's manufacturing sector. The findings indicate that advancing market-oriented reforms in SOEs and achieving a more rational allocation of resources can effectively stimulate economic growth.

REFERENCES

1. Ackerberg, D. A., Caves, K., & Frazer, G. (2015). Identification Properties of Recent Production Function Estimators. *Econometrica*, *83*(6), 2411–2451. https://doi.org/10.3982/ECTA13408
2. Agustina, F. S. (2018). Import competition and local labor markets: The case of Indonesia. *Economic Journal of Emerging Markets*, 177–186. https://doi.org/10.20885/ejem.vol10.iss2.art6
3. Amiti, M., & Konings, J. (2007). Trade liberalization, intermediate inputs, and productivity: Evidence from Indonesia. *American Economic Review*, *97*(5), 1611–1638. https://doi.org/10.1257/aer.97.5.1611
4. Atkin, D. (2016). Endogenous skill acquisition and export manufacturing in Mexico. *American Economic Review*, *106*(8), 2046–2085. https://doi.org/DOI: 10.1257/aer.20120901
5. Autor, D. H., Dorn, D., & Hanson, G. H. (2013). The China syndrome: Local labor market effects of import competition in the United States. *American Economic Review*, *103*(6), 2121–2168. https://doi.org/DOI: 10.1257/aer.103.6.2121
6. Balsvik, R., Jensen, S., & Salvanes, K. G. (2015). Made in China, sold in Norway: Local labor market effects of an import shock. *Journal of Public Economics*, *127*, 137–144. https://doi.org/10.1016/j.jpubeco.2014.08.006
7. Dauth, W., Findeisen, S., & Suedekum, J. (2014). The rise of the East and the Far East: German labor markets and trade integration. *Journal of the European Economic Association*, *12*(6), 1643–1675. https://doi.org/10.1111/jeea.12092
8. Donoso, V., Martín, V., & Minondo, A. (2015). Do Differences in the Exposure to Chinese Imports Lead to Differences in Local Labour Market Outcomes? An Analysis for Spanish Provinces. *Regional Studies*, *49*(10), 1746–1764. https://doi.org/10.1080/00343404.2013.879982
9. Holappa, V. (2022). The impact of the Chinese import shock on Finnish regional labor markets. *Journal of the Finnish Economic Association*, *3*(1). https://journal.fi/jfea/article/view/126796

10. Jermakowicz, W., & Kozarzewski, P. (1996). *Privatization in Mongolia*. CASE-Center for Social and Economic Research. https://ideas.repec.org/p/sec/cnstan/0103.html
11. Kis-Katos, K., & Sparrow, R. (2015). Poverty, labor markets and trade liberalization in Indonesia. *Journal of Development Economics*, *117*, 94–106. https://doi.org/10.1016/j.jdeveco.2015.07.005
12. Marshall, R., Nixson, F., & Walters, B. (2007). Privatisation and regulation in an Asian transitional economy: The case of Mongolia. *Public Administration and Development*, *27*(5), 439–451. https://doi.org/10.1002/pad.454
13. McCaig, B., & Pavcnik, N. (2018). Export markets and labor allocation in a low-income country. *American Economic Review*, *108*(7), 1899–1941. https://doi.org/DOI: 10.1257/aer.20141096
14. Melitz, M. J. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica*, *71*(6), 1695–1725. https://doi.org/10.1111/1468-0262.00467
15. Pavcnik, N. (2002). Trade liberalization, exit, and productivity improvements: Evidence from Chilean plants. *The Review of Economic Studies*, *69*(1), 245–276. https://doi.org/10.1111/1467-937X.00205
16. Pierce, J. R., & Schott, P. K. (2016). The surprisingly swift decline of US manufacturing employment. *American Economic Review*, *106*(7), 1632–1662. https://doi.org/DOI: 10.1257/aer.20131578
17. Topalova, P. (2010). Factor immobility and regional impacts of trade liberalization: Evidence on poverty from India. *American Economic Journal: Applied Economics*, *2*(4), 1–41. https://doi.org/DOI: 10.1257/app.2.4.1
18. Yu, M. (2015). Processing trade, tariff reductions and firm productivity: Evidence from Chinese firms. *The Economic Journal*, *125*(585), 943–988. https://doi.org/10.1111/ecoj.12127