

Trade Openness and Intergenerational Income Flow

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Abstract

This paper analyzes the impact of trade opening on intergenerational income flow from two dimensions: the proportion of trade opening and export structure. The empirical analysis is carried out by using the data of China Health and Nutrition Survey (CHNS) from 1997 to 2015. The results show that the increase of the proportion of trade exports and the optimization of trade export structure will promote intergenerational income flow. In the adjustment process of China's trade development from total growth to structural optimization, the intergenerational income mobility of urban residents has been significantly improved, which provides an important way for China to improve the intergenerational mobility of low-income groups through the process of urbanization. The improvement of intergenerational income flow is attributed to the improvement of education level brought by trade opening. Trade opening improves the education level of children, and then promotes intergenerational income flow. Therefore, it is of great policy significance to expand opening-up, build an educational power and constantly promote the process of urbanization.

Keywords

Trade Opening, Intergenerational Income Flows, Quantile Regression

1. Introduction

Since the reform and opening up, the average disposable income of our people has increased significantly, but the income inequality is also increasing. According to the calculation of the world bank, the Gini coefficient was 0.34 in 1990 and 0.61 in 2010 by the China Household Finance Survey Center of Southwest University of Finance and economics, far exceeding the income gap "warning line" of 0.4 proposed by the United Nations. However, for families and individuals, in addition to

the income gap within a year, the issue of intergenerational opportunity equity is more important in the long run. One of the indicators to measure intergenerational equity is intergenerational income flow. [Deng et al. \(2013\)](#) estimated that China's intergenerational income elasticity was 0.43. In 2017, Guizhou's per capita disposable income was 15121 yuan and the national per capita disposable income in the same year was 25974 yuan, which means that Guizhou residents need four generations of talents to reach the national per capita income level. The solidification of social income structure will seriously affect the long-term development of society. Therefore, the improvement of intergenerational income mobility in China is an urgent problem to be solved.

With the rapid increase of per capita income, China's foreign trade has increasingly become an important part of economic growth. The total import and export volume of foreign trade has increased rapidly, and significant changes have taken place in the export structure. In the 1990s, after the transformation of China's export products to industrial manufactured products, the upgrading of export structure shows that the proportion of capital intensive products has increased steadily. Looking at the economies with relatively open international trade environment, Denmark, the United States, the United Kingdom and Australia have intergenerational income elasticity of about 0.3 and strong social mobility ([Treiman & Yip, 1989](#); [Treiman et al., 1998](#); [Nicoletti & Ermisch, 2007](#)), while the country with relatively closed trade and economic environment is India, Vietnam's intergenerational income elasticity is about 0.4 ([Khor & Pencavel, 2010](#)).

[Becker \(1979\)](#) pointed out that the same resource advantage behaves differently in different economic environments. In an open economic environment, the impact of the same parent resource advantage on the children is less than its advantage on the children in a closed economic environment. In the open social and economic environment, the evaluation criteria of personal ability are complete and diverse. The social demand for high skills and the return of high-ability people make personal value more dependent on personal ability rather than family resources. Intergenerational income elasticity is used to measure intergenerational income mobility. The higher the intergenerational income elasticity, the greater the dependence of children on their parents' income, and the lower the intergenerational mobility.

This trend makes us wonder whether China's trade opening-up has an impact on intergenerational income mobility. Through what channels does it act on intergenerational income flow?

This paper attempts to answer the above questions: First, explore the relationship between trade openness and intergenerational income flow; Second, study the channels and mechanisms of trade liberalization affecting intergenerational income flows, hoping to further promote the understanding of intergenerational income flows. This paper analyzes the impact of trade opening from two dimensions: the export proportion of trade opening and the structure of trade

export. Firstly, through the Markov chain method, this paper uses the factual data to analyze the impact of the change of trade scale and trade structure on the change of intergenerational relative income status, and obtains the basic factual conclusions. In the classical intergenerational income flow model, the factors of trade scale and trade structure are added to explore the mechanism of trade openness on intergenerational income flow in theory, and an empirical estimation model is obtained. Using the empirical test method of quantile regression, the total amount of trade opening is measured by the proportion of exports in GDP, and the trade export structure is measured by the proportion of industrial manufactured products in exports and capital intensive products in exports.

It is found that the increase of the proportion of trade exports and the optimization of trade export structure will promote intergenerational income flow. At the same time, the multi-dimensional trade measurement shows the difference of the impact of trade opening on intergenerational liquidity. The increase of the proportion of trade exports can promote the intergenerational income mobility of middle and high-income groups, and the optimization of export structure can significantly promote the intergenerational mobility of middle-income groups. In the adjustment process of China's trade development from total growth to structural optimization, the intergenerational income mobility of urban middle and high-income residents has been significantly improved, which is greater than the benefits of rural residents, which provides an important way for China to improve the intergenerational mobility of low-income groups through the process of urbanization. The improvement of intergenerational income flow is attributed to the improvement of education level brought by trade opening. Trade opening improves the education level of children, and then promotes intergenerational income flow.

The main contributions of this paper are as follows: First, it is not limited to the influencing factors of internal family or social transformation, but takes into account the impact of external economic environment factors on intergenerational income flow. Second, adding trade factors into the classic intergenerational income flow model, it proves theoretically that trade openness promotes intergenerational income flow, and explores the mechanism of multiple dimensions of trade openness on intergenerational income flow.

The follow-up arrangement of this paper is as follows: the second part summarizes the previous literature; The third part introduces the data sources and analyzes the factual characteristics. The fourth part reports the empirical research results, and the fifth part further analyzes the impact mechanism of trade opening on intergenerational income flow; The sixth part summarizes the full text and puts forward policy suggestions.

2. Literature Review

1) Intergenerational income flow

In addition, at present, more studies turn their attention to the factors and

mechanisms affecting intergenerational income flow, which can be divided into three channels: human capital investment, congenital endowments such as genes and changes in social environment.

Becker and Tomes (1986) first affirmed the role of intergenerational human capital investment and laid the foundation for a series of follow-up studies. Nakamura and Murayama (2011) believed that it was difficult for parents of low-income families to borrow enough money to invest in children's human capital, resulting in the reduction of intergenerational mobility. On this basis, some literatures try to analyze the impact of fiscal expenditure on intergenerational income flow from the perspective of public policy, such as public education policy (Restuccia & Urrutia, 2004) and income tax policy (Zhu & Vural, 2012). Mayer and Lopoo (2008) studied the impact of fiscal education expenditure on intergenerational income elasticity by using the differences between States and different periods in the United States. It was found that the intergenerational income elasticity of the group with high per capita fiscal education expenditure was 0.17 higher than that of the group with low fiscal education expenditure. Zhou Bo and Su Jia (2012) found that China's county-level education expenditure will significantly reduce the intergenerational income elasticity, and the impact of science, education, culture and health expenditure is not obvious.

Congenital endowment factors are mainly the role of parents' genes, such as the inheritance of children's cognitive ability and health from their parents. Björklund et al. (2005) found that the education level of the biological mother has a more important impact on the income of the children than that of the adoptive mother, while the long-term income of the adoptive father has a stronger impact on the income of the children than that of the biological father, and the intergenerational transmission coefficient of the biological mother is slightly higher than that of the biological father. It shows that genes have a significant impact on intergenerational income transmission. Bhattacharya and Mazumder (2011) found that the differences in adolescents' cognitive skills lead to great differences in intergenerational mobility between blacks and whites in the United States. Measuring adolescents' cognitive level with afqt score, blacks' cognitive skills are lower than whites, which hinders the upward mobility of the next generation of blacks.

The impact of changes in social environment on intergenerational income flows, such as changes in social nature and socio-economic system. Fan (2016) used the chip survey data in 1995 and 2002 to find that before China's economic transition, the ownership of work units made the greatest contribution to the intergenerational income persistence of families below the average income, while social capital made the greatest contribution to families above the average income. After the economic transition, parents with income below the average level significantly increased their investment in children's education. It leads to the continuous growth of intergenerational income, and the growth of children's income in families with higher than average income is mainly brought by social

capital.

2) The impact of trade opening on income gap

There are a series of rich studies on the impact of trade opening on income gap. The leading framework for early research on trade opening and income gap is H-O Model and S-S theorem, which holds that trade can reduce income gap because trade increases the actual return of abundant factors, such as the significant increase of low skilled workers in developing countries after trade opening. However, in most empirical studies, there is no strong evidence of the reduction of income gap in developing countries after trade opening (Attanasio et al., 2004; Han et al., 2012; Harrison et al., 2010; Menezes-Filho et al., 2008). This makes the majority of scholars try to reinterpret this phenomenon.

Xu (2003) extended the H-O Model to emphasize the relationship between factors and product portfolio. When factor prices are not balanced by trade, these products are relatively skill intensive in the production of southern countries. The trade openness of the South has expanded its imports and reduced the inequality effect. At the same time, it worsens the terms of trade of the countries of the south, improves the export competitiveness of the countries of the south, expands the export groups of the countries of the South and intensifies inequality.

The second explanation is based on biased technological progress. Li and Coxhead (2011) believe that the biased technological progress caused by trade opening exacerbates the inequality of developing countries. As favored regions benefit more from trade and their demand for skills is increasing, which leads to the loss of skilled workers in poor areas. The average income growth of the former is faster than that of the latter, which increases the inequality in the region. This conclusion is supported by Rattso and Stokke (2013), which points out that the trade effect through technology adoption and skill bias may be an important determinant of wage inequality in middle-income countries.

The third explanation is from the perspective of the increase of intermediate goods and vertical specialization. Feenstra and Hanson (1996) believe that trade has an impact on wages and employment through the number of skilled and unskilled labor employed in exports and imports, while the increase of outsourcing helps to increase the wages of skilled workers in outsourcing receiving countries. Reduce the relative employment and wages of unskilled workers and bring about income gap.

In the process of trade opening up, China's income gap is widening day by day, which has also attracted extensive attention. Han et al. (2012) analyzed the impact of trade opening during Deng Xiaoping's southern tour in 1992 and China's accession to the WTO in 2001, and found that China's accession to the WTO was significantly related to the intensification of wage inequality. At the same time, trade opening promoted equality in the region by improving the return on education. Wei et al. (2012) used the panel data of China's provinces from 1978 to 2007 to find that international trade has a fundamental impact on urban-rural income inequality. Li Lei et al. (2012) found that trade openness has

a significant and steady positive effect on income level by using the data of China household income survey in 2002. In particular, the impact on high skilled labor force is greater than that on low skilled labor force.

Compared with previous studies, this paper has the following characteristics: In the current reality of the information age with frequent external communication, the external environment is bound to have an impact on intergenerational income flow, which is not limited to the influencing factors of internal family or social transformation, and the external economic environment factors are taken into account. The impact of trade opening on intergenerational income flow essentially depicts the dynamic changes of the impact of trade opening on income gap, which can deepen the understanding of income gap.

3. Data Sources and Factual Features

1) Data source

The data of China Health and Nutrition Survey (CHNS) from 1997 to 2015 were used to cover urban and rural areas in 8 provinces. The economic development data of each region comes from the China Regional Economic Statistical Yearbook, China Urban Statistical Yearbook, regional statistical yearbook and national economic and social development statistical bulletin of each year. With reference to the method of [Liang and Pescatore \(2014\)](#), the two indicators of regional population and regional land area are matched with CHNS data, The economic indicators of 54 county-level cities in CHNS data are obtained.

When selecting individual samples, obtain the individual's family relationship data through the survey year, individual number and family number, and match the offspring with the parent, including individual age, household registration, occupation, income, education level and other indicators, so as to obtain the basic information between generations. Assuming that the income is obtained at the same time when there is an occupation, the following situations are excluded: a) select the sample in the school by eliminating the question "whether it is in school"; b) Eliminate the problem "whether it is working" and select the sample without; c) Eliminate the question "whether to retire" and select the retired samples. According to the requirements of China's legal working age, the sample age is limited to 16 - 65 years old. Because previous studies have believed that there are gender differences in income levels, this paper only selects the income of fathers and sons into the study of intergenerational income flow, and does not consider the relationship between trade openness and intergenerational income flow between fathers and daughters, mothers and sons and mothers and daughters.

2) Factual features

Using the Markov chain method, Markov chain is a dynamic system. The state transition probability from t period to $t + 1$ period is studied. It is related to the current state and transition probability, and has nothing to do with the previous state. Markov chain method is used to explore the impact of trade openness and

changes in trade export structure on the probability of intergenerational income flow transfer, and intuitively provide evidence for the research problem of this paper from the data.

The state space of Markov chain is composed of three dimensions: the degree of trade openness and the relative income status of parents and children. Among them, the degree of trade openness is high and low, and the income is low, medium and high, which are combined into 18 states. The Markov transfer probability table is sorted into **Table 1**.

As can be seen from **Table 1**, for regions with high degree of trade openness, when the relative income of children is lower than or equal to that of their parents, there is a greater probability of mobility, with the probability of 33.43% and 45.79% respectively, while the probability of intergenerational income mobility in regions with low degree of trade openness is slightly lower than that in regions with high degree of trade openness. Especially when regions with low degree of trade openness gradually expand their opening-up, their intergenerational income mobility increases by about 1.5 times. For children whose relative income status is lower than that of their parents, their intergenerational income mobility increases by 51.52% after the expansion of trade openness. The same is true for groups whose relative income status is the same as or higher than that of their parents. This shows that trade openness greatly improves the probability of intergenerational income flow and reduces the probability of children staying in the income state of their parents.

Table 1. Transfer probability of trade opening to intergenerational income flow (%).

initial	late				
Relative income					
children < parents	children = parents	children > parents	flow	Increased trade openness	
				steady	move
High degree of trade openness	23.05	33.43	33.43	—	—
Low degree of trade openness	11.6	20.7	32.3	16.18	83.82
children = parents	children < parents	children > parents	flow	Increased trade openness	
				steady	steady
High degree of trade openness	28.78	17.01	45.79	—	—
Low degree of trade openness	39.4	2.45	41.85	20.7	79.3
children > parents	children < parents	children = parents	flow	Increased trade openness	
				steady	flow
High degree of trade openness	21.9	21.25	43.15	—	—
Low degree of trade openness	32.73	25.67	58.4	21.04	78.96

4. Econometric Model and Empirical Results

1) Econometric model

According to the above literature analysis, build the following measurement models:

$$\log y_{i,t} = \beta G_t \log y_{i,t-1} + \varpi_t$$

Trade openness G and children's income $\log y_{i,t}$, there is no inverse correlation. Therefore, it is assumed that there is a linear relationship between children's income and trade openness:

$$\frac{\partial \log y_{i,t}}{\partial \log y_{i,t-1}} = \beta G_t + \rho_t$$

The conditional quantile model is used to investigate the impact of trade opening on intergenerational mobility in different income quantiles. There is the following formula:

$$Q_\vartheta (\log y_{i,t} | X) = \phi_\vartheta + (\beta_\vartheta G_t + \rho_\vartheta) \log y_{i,t-1} + \psi_\vartheta + \varpi_\vartheta$$

Main explanatory variable G_t is the trade openness of the city, X_{ic} is other control variables at the individual level, ψ_ϑ Are other control variables at the city level, ϖ_ϑ Is a random error term with $Q_\vartheta (\varpi_\vartheta | X) = 0$.

2) Index selection

a) Explained variable: Logarithm of children's income—lnY_son: the logarithm of children's income in a single year. Only the sample with children as sons is retained

b) Explanatory variables:

Trade Openness—Open: the degree of trade openness is expressed by the proportion of exports of each province in total output. This index measures the impact of the growth of total trade.

Export proportion of capital intensive products—capitalratio: the export proportion of capital intensive products at the provincial level accounts for the total export. Capital intensive products are chemical products, transportation equipment and mechanical products in industrial manufactured products, which are used to measure the export commodity structure of each province.

Parent income logarithm—lnY_father: the logarithm of parents' income in a single year. The father's income sample is adopted, and the sample with only mother's income is excluded. In the robustness test, the multi-year average income of parents is used. Among the samples, 1858 cases use single period income, 784 cases use two-year average income, 287 cases use three-year average income, and 181 cases use more than four years average income.

c) Control variable

At the family level, control the age of children—age, the square age of children—age2, and the age of parents—age_f. Square of father's age—age4 and father's occupation—job_f. Father's education—edu_f. Due to the inability to obtain the lifetime income of children and parents, controlling the square of age

and age can weaken the effect of increasing age and income (Blanden, 2013). The father's occupation and education measure the impact of family resources on the income of children.

At the urban level, control the proportion of the population with junior high school education in the total population—*midratio*, *lnindustry* of manufacturing employees—*lnindustry* and *lnservice* of service employees—*lnservice*. Macroscopically, the improvement of education level and the change of industrial structure can drive the change of regional income.

d) Descriptive statistics

As shown in **Table 2**, if the parents are in the top 10% income class, their children have a 33.02% probability of remaining in the top 10% income class, and the probability of their children flowing to the low-income class will gradually decrease. In contrast, the parents are in the lower 10% of the income class, and their children are still in the lower 10% of the income class with a probability of 28.8%, and the probability of their children flowing to the high-income class is also gradually reduced.

3) Benchmark results

a) The impact of trade opening on intergenerational mobility

The benchmark regression results in **Table 3** show that trade openness has a negative impact on intergenerational income elasticity. With the increase of trade openness, the dependence of children's income on parents' income will gradually decrease, indicating that trade openness has improved intergenerational mobility. The degree of trade increased by 0.1%, and the intergenerational

Table 2. Descriptive statistics.

Variable	Sample	Average	S.D.	Minimum	Maximum
<i>lnY_son</i>	3058	8.466	1.493	1.204	13.305
<i>lnY_father</i>	3054	8.432	1.365	2.526	13.082
<i>exportratio</i>	3110	0.0570	0.1023	0	0.7683
<i>manuratio</i>	3111	0.8593	0.0948	0.617	0.9868
<i>captialratio</i>	3111	0.3705	0.1682	0.014	0.747
<i>lnindustry</i>	3110	2.7355	1.0185	0.3985	5.1221
<i>lnservice</i>	3110	2.8984	0.8195	0.8796	4.8743
<i>midratio</i>	3110	0.9773	36.3895	0.0148	0.253
<i>age</i>	3110	25.8733	5.7812	16	45
<i>age2</i>	3110	702.8405	324.449	256	2025
<i>age_f</i>	3110	53.6147	6.9066	36	65
<i>age4</i>	3110	2922.23	756.4494	1296	4225
<i>edu_f</i>	3051	1.4568	1.1367	0	9
<i>job_f</i>	3059	4.7152	1.9460	0	9

Table 3. Benchmark regression results.

Variable	(1) lnY_son	(2) lnY_son	(3) lnY_son	(4) lnY_son
lnY_father	0.561*** (0.0194)	0.390*** (0.0208)	0.673*** (0.059)	0.471*** (0.058)
exporratio	5.060*** (1.597)	5.628*** (1.557)		
lnY_father#exporratio	-0.443** (0.173)	-0.552*** (0.168)		
captialratio			1.285 (0.9905)	1.349** (0.51)
lnY_father#captialratio			-0.195* (0.114)	-0.143*** (0.046)
lnindustry	0.0296 (0.0503)	0.0842 (0.0587)	0.0176 (0.05)	0.151*** (0.051)
lnservice	0.0162 (0.0624)	-0.0340 (0.0627)	0.056 (0.062)	-0.031 (0.0603)
midratio	-7.45e-05 (0.000565)	-0.000561 (0.000537)	0.0001 (0.00057)	-0.00037 (0.00054)
age	0.244*** (0.0324)	0.206*** (0.0308)	0.257*** (0.0323)	0.233*** (0.031)
age2	-0.0033*** (0.000567)	-0.00306*** (0.00053)	-0.0035*** (0.0005)	-0.003** (0.00053)
age_f	-0.0362 (0.0480)	0.00373 (0.0456)	-0.0109 (0.048)	0.0032 (0.045)
age4	0.000289 (0.000436)	-3.21e-05 (0.000414)	0.00002 (0.0004)	-0.00006 (0.00041)
edu_f	0.115*** (0.0211)	0.0510** (0.0209)	0.064*** (0.012)	-0.005 (0.0128)
job_f	0.0822*** (0.0115)	0.00942** (0.0128)	0.022** (0.008)	0.0206** (0.008)
fixed effect	NO	YES	NO	YES
N	2904	2904	2966	2966

Notes: “***” is significant at 1%, “**” is significant at 5% and “*” is significant at 10%.

income elasticity decreased by 0.552%. At the same time, the income of children will be affected by family resources. The education and occupation of parents have a positive role in promoting the income of children. The higher the education and professional status of fathers, the higher the income of children.

b) The impact of trade opening on intergenerational mobility of different income quantiles

The income quantiles of 10%, 25%, 50%, 75% and 90% are reported. The estimated results show that in **Table 4**, under the same degree of trade openness, it has the greatest impact on the intergenerational income flow of children whose income is in the 50% quantile. For every 0.1 increase in the degree of trade openness, the intergenerational income elasticity decreases by 0.802. It has no significant impact on the intergenerational income flow of children whose income is 10% and 25%. The promotion of trade openness to intergenerational mobility is significant for individuals with income quantiles ranging from 37% to 95% at the 95% confidence level. That is, if the children live in areas with a higher degree of trade openness, their income will be less dependent on their parents' income than those living in areas with a lower degree of trade openness. Trade openness has a stronger impact on the intergenerational mobility of the middle and high-income class, and has no significant impact on the intergenerational

Table 4. Regression results of different income quantiles.

Variable	lnY_son				
	(1) 10% Income quantile	(2) 25% Income quantile	(3) 50% Income quantile	(4) 75% Income quantile	(5) 90% Income quantile
lnY_father # exporatio	-0.0605 (0.403)	-0.280 (0.191)	-0.802*** (0.170)	-0.571*** (0.137)	-0.430** (0.206)
exporatio	1.293 (3.713)	3.565** (1.764)	8.422*** (1.563)	6.336*** (1.265)	4.986*** (1.900)
lnY_father	0.504*** (0.0501)	0.602*** (0.0238)	0.504*** (0.0211)	0.253*** (0.0171)	0.192*** (0.0257)
lnindustry	0.328*** (0.126)	0.183*** (0.0599)	0.0798 (0.0531)	0.0410 (0.0430)	0.00793 (0.0646)
lnservice	-0.160 (0.147)	-0.134* (0.0697)	-0.0109 (0.0618)	-0.000621 (0.05)	0.0091 (0.0751)
midratio	-0.00015 (0.0013)	-0.00026 (0.0006)	-0.0004 (0.00056)	-0.0006 (0.00045)	-0.00076 (0.0007)
age	0.353*** (0.0755)	0.251*** (0.0359)	0.154*** (0.0318)	0.126*** (0.0257)	0.103*** (0.0386)
age2	-0.005*** (0.001)	-0.0038*** (0.0006)	-0.002*** (0.0005)	-0.00185*** (0.000449)	-0.00139** (0.000674)
age_f	-0.0120 (0.112)	-0.0295 (0.0530)	0.00873 (0.0470)	-0.00129 (0.0380)	-0.00562 (0.0571)
age4	4.85e-05 (0.00101)	0.000272 (0.000482)	-3.80e-05 (0.000427)	1.65e-05 (0.000346)	-6.28e-06 (0.000519)
edu_f	0.0559** (0.0206)	0.0314** (0.0140)	-0.0965** (0.0213)	0.0125** (0.0072)	-0.0721** (0.0259)
job_f	-0.0189 (0.0312)	-0.00238 (0.0148)	-0.00540 (0.0131)	0.0137 (0.0106)	0.0231 (0.0160)
fixed effect	YES	YES	YES	YES	YES
N	2904	2904	2904	2904	2904

Notes: “***” is significant at 1%, “**” is significant at 5% and “*” is significant at 10%.

income mobility of the low-income class. The estimated coefficient below the 37% income quantile is not significant, indicating that trade opening does not significantly promote the intergenerational flow below the 37% income quantile, but the variance increases significantly compared with other quantiles, indicating that the model has a weak explanation for the low-income quantile.

4) Robustness analysis

a) Multi-year average income of parents

In the intergenerational income flow, the estimation of intergenerational income elasticity is affected by individual income error, which may lead to the overestimation of intergenerational income flow. The impact of the average income of parents on trade opening is tested for robustness. **Table 5** shows the estimation results. Similar to the quantile regression results of the benchmark, the improvement of trade openness will promote the intergenerational income flow of middle and high-income groups and alleviate the dependence of children on their parents' income. Especially for the class whose income is in the 50% quantile, the degree of trade openness will increase by 0.1, and the intergenerational income elasticity will decrease by 0.000017. Compared with the benchmark regression results, the impact of trade openness on intergenerational income flow is slightly reduced. Using the average income of parents for many years alleviates

the estimation error caused by the lack of lifetime income of parents, However, it is generally consistent with the benchmark estimation results, and the benchmark results are robust.

In terms of export commodity structure, the export proportion of capital intensive products will also have a significant impact on the intergenerational income flow of middle and high groups.

b) Relative income status

In addition to using the average income of the father for many years, the relative income status of the individual is measured by the percentile of the individual in the income distribution of the current year, and the robustness test is carried out. As shown in **Table 6**, using the relative income status of individuals to calculate the intergenerational income elasticity, trade openness will significantly promote the intergenerational income flow, especially for the middle and high-income class, the improvement of trade openness will significantly promote the intergenerational income flow. The regression results of the robustness test show that the degree of trade openness will also promote the flow of intergenerational income status,

Table 5. Regression results of different income quantiles.

Variable	lnY_son				
	(1) 10% Income quantile	(2) 25% Income quantile	(3) 50% Income quantile	(4) 75% Income quantile	(5) 90% Income quantile
lnY_father # exportratio	-1.85e-06 (2.05e-05)	-1.52e-05 (1.22e-05)	-1.70e-05* (9.70e-06)	-2.27e-05*** (7.62e-06)	-2.09e-05** (8.62e-06)
exportratio	1.386** (0.658)	1.604*** (0.392)	1.691*** (0.312)	1.535*** (0.245)	1.533*** (0.277)
lnY_father	5.86e-06** (2.42e-06)	6.37e-06*** (1.44e-06)	6.59e-06*** (1.15e-06)	9.67e-06*** (9.02e-07)	9.80e-06*** (1.02e-06)
fixed effect	YES	YES	YES	YES	YES
N	2944	2944	2944	2944	2944

Notes: “***” is significant at 1%, “**” is significant at 5% and “*” is significant at 10%.

Table 6. Regression results of different income quantiles.

Variable	lnY_sonrank				
	(1) 10% Income quantile	(2) 25% Income quantile	(3) 50% Income quantile	(4) 75% Income quantile	(5) 90% Income quantile
lnY_frank # exportratio	-0.246 (0.659)	-0.516 (0.377)	-0.692** (0.307)	-0.459** (0.222)	-0.359** (0.171)
exportratio	1.594 (1.220)	1.606** (0.698)	1.801*** (0.569)	1.075*** (0.410)	0.807** (0.317)
lnY_frank	0.495*** (0.0621)	0.633*** (0.0356)	0.512*** (0.0290)	0.219*** (0.0209)	0.112*** (0.0162)
fixed effect	YES	YES	YES	YES	YES
N	2505	2505	2505	2505	2505

Notes: “***” is significant at 1%, “**” is significant at 5% and “*” is significant at 10%.

and the proportion of capital intensive products exports also increases the intergenerational flow of 25% - 95% income quantile, which is robust in the regression results.

5. Conclusion

This paper studies whether trade openness promotes social intergenerational income flow. According to [Becker and Tomes \(1986\)](#), in an open economy, personal ability will play a stronger role than family resource background. Therefore, in the process of trade opening up, personal ability plays a stronger decisive role in the income of children, and the role of family resource background will gradually weaken,

This paper incorporates trade factors into the classic intergenerational income flow model, and uses the empirical method of quantile regression to verify the theory.

Matching the macro data of each region with the micro individual data from CHNS survey data, firstly, using the method of Markov chain, this paper analyzes the factual characteristics of the impact of trade opening on intergenerational income mobility from the two dimensions of trade scale and trade export structure, and finds that trade opening enhances intergenerational income mobility. In particular, the increase in the export proportion of capital intensive products can promote intergenerational income flow to a greater extent and hinder the downward trend of intergenerational income flow to a certain extent. Compared with the increase in the export proportion of labor-intensive products, the increase in the proportion of capital intensive products can enhance the overall intergenerational income mobility. On the other hand, it reduces the gap of income flow between generations.

On this basis, trade factors are incorporated into the intergenerational income flow model of [Becker and Tomes \(1986\)](#), and the impact mechanism of trade openness on intergenerational income flow is explored. The degree of trade openness increases. With the expansion of trade scale, trade openness changes the export structure, the proportion of capital intensive products increases, and the demand for highly skilled labor increases. The improvement of the rate of return on education urges parents to increase their investment in skill education for their children. The improvement of children's education reduces their dependence on their parents' income and increases intergenerational mobility. Further use the data of China Health and Nutrition Survey (CHNS) from 1997 to 2015 to empirically test the conclusion of the model, and analyze the impact of trade opening on different groups from the aspects of income, urban and rural areas.

It is found that trade openness can significantly promote intergenerational income flow, and the increase of the proportion of trade exports and the optimization of trade export structure will promote intergenerational income flow. At the same time, the multi-dimensional trade measurement shows the differ-

ence of the impact of trade opening on intergenerational mobility. The increase of the proportion of trade exports can promote the intergenerational income flow of middle and high-income groups. The optimization of export structure can significantly promote the intergenerational mobility of middle-income groups. In the adjustment process of China's trade development from total growth to structural optimization, the intergenerational income mobility of urban middle and high-income residents has been significantly improved, which is greater than the benefits of rural residents, which provides an important way for China to improve the intergenerational mobility of low-income groups through the process of urbanization. The improvement of intergenerational income flow is attributed to the improvement of education level brought by trade opening. Trade opening improves the education level of children, and then promotes intergenerational income flow.

As trade openness has significantly improved intergenerational income mobility, China's long-term adherence to the basic national policy of "opening to the outside world" has objectively promoted intergenerational income equality. However, the expansion of trade scale and the transformation of trade structure have more enhanced the intergenerational income mobility of middle-income groups, and the promotion of intergenerational income mobility at both ends of income groups is not obvious. To some extent, it explains the reality of the widening income gap in China. On the whole, trade opening plays a greater role in urban intergenerational income mobility than rural intergenerational mobility, which shows that in the process of China's trade structure transformation, we should adhere to promote the process of urbanization, reduce the restrictions of rural children on family resources, and promote the intergenerational equity of the population as a whole. At the same time, we should ensure the coverage of compulsory education, improve the support of public financial expenditure for education, expand the time period of compulsory education, pay attention to skill training and vocational training, establish an education system benefiting the whole people, and give birth to more equitable channels of choice.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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