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The Effect of Trade Liberalization on Intergenerational Income Mobility

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Abstract

The recent backlash against globalization, including the Sino-US trade war and Brexit, has highlighted the discussion on the effect of trade on economic inequality. This paper employs a probit model to investigate the effect of trade liberalization on intergenerational income mobility based on micro-level data from China Health and Nutrition Survey and macro-level data from Regional Statistic Yearbooks in 1989-2015. Most notably, we study how industrialization and upward education mobility explain the underlying mechanisms of such effect. The results indicate that a high level of trade openness may promote upward income mobility for both sons and daughters and restrain downward income mobility for daughters. Therefore, China should keep up its process of reform and opening up, further eliminating trade barriers and strengthening international cooperation to provide equal opportunities of high-skilled occupations for individuals from different family backgrounds. Chinese families should be encouraged to provide equal educational opportunities for boys and girls.

Keywords

Trade Liberalization, Income Inequality, Intergenerational Income Mobility

1. Introduction

Economic inequality and social stratification has been one of the major concerns for many societies during the last decades (Henwood, 2003; Piketty, 2015; Huang et al., 2019; Aiyar & Ebeke, 2020; Savage, 2021). Existing research on economic inequality mainly focuses on two perspectives: one is the inequality of economic outcome, often referred to as income inequality, and the other is the inequality of economic opportunities, characterizing intergenerational income mobility. Despite rapid economic growth in developing countries, there remains a large in-

come gap between countries and within countries. According to the World Inequality Report 2018 (Piketty, Saez, & Zucman, 2018), income inequality has been increasing in almost every country during the last decade with high speed in North America, China, India, Russia and moderate speed in European countries, together with strikingly decreasing intergenerational income mobility. Among the many social and economic factors, international trade has been argued to be one driving force that is responsible for the increasing economic inequality. The recent backlash against international trade, especially the US 2016 presidential campaign, Sino-US trade war and Brexit, also brought back the academia's attention to the effect of trade on income inequality in economic development.

A large proportion of existing literature reveals that international trade has increased income inequality both in developed countries (Katz & Murphy, 1992; Borjas et al., 1997; Corak, 2013; Hilger, 2015) and in developing countries (Robbins & Gindling, 1999; Goldberg & Pacvnik, 2007; Fan et al., 2021). Although empirical evidence (Topalova, 2007; Goldberg & Pacvnik, 2007) shows inconsistency with the traditional Heckscher-Ohlin model's analysis on trade and inequality, some novel mechanisms including effects of offshoring, effects of labor markets frictions among others have gained considerable empirical support (Feenstra & Hanson, 1999; Helpman et al., 2017), indicating that trade could be a plausible explanation of the widening income gap.

While most previous studies focused on the effects of trade on intergenerational income inequality, there has been comparatively little discussion over the effects of trade on intergenerational income mobility, which serves as a channel for the long-term effect of international trade on economic inequality. Previous studies indicate that countries with high inequality levels tend to have low intergenerational mobility (Björklund & Jäntti, 2009), named as the Great Gatsby curve. Thus, studying intergenerational income mobility and its channels sheds light on the ways to mitigate economic inequality.

Recent research by Ahsan and Chatterjee (2017) on trade liberalization and intergenerational occupational mobility in urban India indicated that given a higher level of trade openness, sons have a higher possibility in gaining a better occupation than their fathers. It is thus necessary to conduct further studies on the relationship between trade openness and intergenerational income inequality to delineate a clearer picture of the effect of trade on economic inequality.

Since its accession to the World Trade Organization, China has witnessed a widening income gap and increasing income inequality. In the late 1970s, the level of income inequality in China was much lower than the European average—closer to those observed in the most egalitarian Nordic countries. Nevertheless, the figures are now approaching a level almost comparable with the United States (Piketty et al., 2019). According to the estimation of the China Household Finance Survey Center at Southwestern University of Finance and Economics, China's Gini coefficient was 0.61 in 2010, way above the United Nations

warning line of 0.4. Meanwhile, based on the calculation of intergenerational income elasticity in previous literature (Deng et al., 2013), the intergenerational income elasticity in China is around 0.37 - 0.5, which means that it may take two or three generations for low-income people to rise to a higher income level. The widening income gap and low intergenerational income mobility have become major threats to social fairness in China.

Unlike most existing literature in trade and economic inequality which focus on the effect of trade liberalization in intragenerational income inequality, this paper investigates the relationship between trade liberalization and intergenerational income mobility, providing an innovative perspective that considers economic inequality from both the equality of outcomes (income equality) and equality of opportunities (income mobility).

Also, former empirical studies in intergenerational income mobility focus on father-son relationship considering traditional Chinese Confucian value of leaning more resources to sons rather than daughters, leading to estimation bias. Due to the fact that fewer resources from family may be allocated to daughters, the income of daughters may be more dependent on social and economic environment than boys, and this paper managed to test father-son and father-daughter ties separately. The disparity in the empirical results of father-son and father-daughter ties also provides us with interesting novel findings that trade openness promotes the overall upward education mobility for both males and females, and at the same time, inhibits the downward education mobility for females. Overall, this research not only innovatively studies the effects of trade openness on income inequality and mobility in China but also contributes to the literature on factors affecting intergenerational income mobility from the perspectives of the labor market and economic environment.

The rest of the paper is structured as follows. Section II presents a conceptual framework to discuss trade liberalization and intergenerational income mobility. Section III discusses the data and model setting. Section IV provides our results and its analysis. Section V concludes with a discussion of policy implications.

2. Trade Liberalization and Intergenerational Income Mobility in China

2.1. Trade Liberalization and Its Measurements

Trade liberalization is normally considered as a process where a country gradually eliminates trade barriers, weakens the government's direct intervention in trade activities, expands its opening up and integrates with international practice according to its own economic development conditions, industrial conditions and political considerations (Liao & Fang, 2000). However, there still lacks consensus on a clear definition of trade liberalization. Trade liberalization is reflected in trade openness and researchers would refer the same thing to one another

(Manni & Afza, 2012; Udeagha & Ngepah, 2020), as trade openness was tested to be the major possible result of trade liberalization (Wacziarg & Welch, 2008).

An important question is that how the level of trade liberalization can be measured. Generally speaking, the level of trade liberalization can be reflected through trade performance and government trade policies so that indicators of trade openness and government trade policies can be applied to measure trade liberalization.

Trade openness is mainly measured by the above two methods: the conventional method and a derived approach based on the conventional one. The conventional method uses trade dependency as an indicator to represent trade openness, which refers to the proportion of a region's trade scale to its gross domestic product (GDP). It requires relatively few data, yet the drawback is the difficulty for cross-country comparisons since trade dependency is not only affected by trade policy. Other factors such as the size of the nation and its population may also have an influence on trade dependency. Kuznets (1960) first showed rigorously by statistical data that trade dependencies of different countries decrease as population increases. The generalizability of such conclusion is tested by country-level data in different periods and the within-country time-series data. Therefore, an increasing number of scholars prefer not to use this indicator for cross-country comparisons. However, this cannot obliterate the application of trade dependency considering the convenience of using trade dependency. When measuring trade openness within a country or when there is little variation within the population, this index is sufficient to reflect changes and differences in the degree of trade openness.

Another approach to measure trade openness is to calculate the derivation of actual trade volume from predicted ones (Chenery et al., 1975). This method first uses data from a group of countries with similar characteristics as the investigated country for regression analysis to obtain the trade dependency for the group of countries. Then the trade dependency of the investigated countries can be compared with the synthesized trade dependency, and the comparative residual value represents the openness of the trade system of the investigated country. If the investigated country's trade dependency is greater than the synthesized value and the residual value is greater than zero, it indicates that the country's trading system is more open than that of other countries. On the contrary, if the residual value is less than zero, the openness of the country's trading system is less than the average level of other countries, indicating a more inward trading system.

The derived approach also does not require a large quantity of data with easy access to trade dependencies for each country. Compared with the conventional method, it is able to compare cross-country data and more rigorous than the simple method from a theoretical implication perspective. However, it remains uncertain whether the basis of method—the residual value—can really represent trade openness level in a certain country. The focus of the debate is whether the

trade dependency synthesized from various countries has objective significance, while little support can be found from theoretical evidence. Thus, apart from some specialized literature in economics, the conventional method is used more widely in practice (Frankel & Romer, 1999; Squalli & Wilson, 2011).

Besides trade openness, government intervention can also measure the level of trade liberalization in a certain country such as indices of trade barriers such as tariff rates and non-tariff barriers.

In this paper, since local governments in China follow the central government's overall guidance in trade interventions, government interventions vary little from region to region. Thus trade openness indicators themselves represent most differences. Based on this fact, we apply an outcome-based measurement to measure the different levels of trade liberalization across provinces. Taken into account the advantages of the residual methods, the share of imports and exports in total GDP (IM+EX/GDP) will be used as the independent variable in this paper.

2.2. Intergenerational Income Mobility and Its Measurements

Intergenerational income mobility refers to the extent that individuals' income is independent of their parents' income. If there is no intergenerational income mobility in the society, all children in poor families remain poor when they grow up and those from rich families stay rich. On the contrary, with complete intergenerational income mobility, children from all family backgrounds should have the same possibility to be poor or rich adults. The indicator of intergenerational income mobility is also interpreted as an indicator of equality of opportunities, while the income gap is an indicator of equality of outcomes.

To measure intergenerational income mobility, thre are three approaches widely used in the literature: Intergenerational Income Elasticity (IGE), transition matrices and logistic regression analysis (Moonen & Van Den Brakel, 2011).

The most popular measurement of intergenerational income mobility is Intergenerational Income Elasticity (IGE), which uses a simple linear regression model:

$$\ln\left(Income_{child}\right) = \alpha + \beta \ln\left(Income_{parent}\right) \quad (1)$$

The regression coefficient β indicates Intergenerational Income Elasticity (IGE), which represents the extent to which parents' income can be transmitted to children. Normally, the value of β calculated through empirical analysis is between 0 - 1. For instance, in the case of β = 0.2, 20% of parents' income situation can be transmitted to children's income situation. β = 0 indicates complete intergenerational income mobility in which children's income position is totally unaffected by parents' income position. On the contrary, β = 1 indicates complete immobility in which all children stay in the same income position as their parents (Blanden et al., 2004). However, this measurement also has the disadvantage as it cannot be applied to self-employed people with zero or negative

income.

To deal with such cases, we provide an alternative measurement to measure intergenerational income mobility by transition matrices. In order to form a transition matrix, the income of parents and the income of children are divided into groups based on percentiles. For example, we can create a 10% income group for parents and children. If there is a high percentage of low-income children (10%-quantile) whose parents are also in the low income group (10%-quantile), the society is in low intergenerational income mobility. This percentage can be seen as an indicator of mobility.

The last method of logistic regression analysis can be conducted if we are interested in a particular income group. For instance, we can use logistic regression analysis to study the mobility of higher-income group. The analysis examines one or more independent variables X_1, …, X_n (such as father's occupation and education level) versus the dichotomy dependent variable Y (such as adult children with or without income in the higher part of the income distribution) (Agresti, 2002). The logistic regression model is as below:

$$P(Y) = \frac{1}{1+e^{-(\beta_0+\beta_1 x_1+\beta_2 x_2+\cdots\beta_n x_n+\varepsilon)}} \tag{2}$$

This model does not explain Y, but the probability of Y (adult child with income in the higher part of the distribution). It boils down to the log of the probability of Y over the probability of Y. This ratio is often called odds, and this logarithm is called log-odds or logit. The logistic regression model is very similar to the regression model in a linear regression analysis where β_0 is the intercept, β_1 is the effect of x_1, β_2 is the effect of x_2, etc.

In addition, there are some other methods to solve small sample problem. For instance, Güell, Rodríguez Mora and Telmer (2015) used the method of the Informational Content of Surnames (ICS) to measure intergenerational income mobility in Italy. This method does not require panel data or any explicit links between children and their parents, and a cross-sectional dataset of surnames and economic outcomes is sufficient. However, this method has its own limits for it cannot be used in China where so many people share common surnames.

As this paper is based on China Health and Nutrition Survey (CHNS) data with minor income measurement errors, we prefer not to use the Intergenerational Income Elasticity (IGE) and the logistic regression analysis method since they are very sensitive to measurement errors, which leaves us the transition matrices methods. In order to quantify transition matrices and provide information on the direction of income mobility, we use rank-rank mobility following Ahsan and Chatterjee (2017), which divides people into 10 income groups. This measurement Y is used to represent whether there is upward or downward income mobility between children and parents. $Y = 1$ which represents upward income mobility if the child is in a higher income group than his or her parent and $Y = 0$ if not. Using this method, we can easily identify upward or downward mobility and it is relatively insensitive to potential income measurement errors.

2.3. Trade Liberalization in China

Since China's accession to the World Trade Organization (WTO) in 2001, the development of international trade in China entered the fast track. China further opened its door by fulfilling its WTO commitments by revising trade regulations, reducing tariffs, opening up the service market, and lowering the foreign investment entry barriers. Goods traded in China have exploded at an unprecedented scale and speed. From 2001 to 2007, the total volume of imports and exports of goods soared from the US $509.65 billion in 2001 to the US $2176.57 billion in 2007, with an average annual growth rate of 27.4%, exceeding the global average of 7%. During this period, China quickly grew into the world's second-largest exporter and third-largest importer of goods, becoming a "world factory".

The growth rate of imports and exports has slowed down since the financial crisis in 2008. In 2009, China's import and export trade experienced negative growth of 13.9% for the first time since the reform and opening up with a year-on-year decrease of 355.7 billion U.S. dollars. Export was affected severely with a year-on-year decrease of 299.1 billion U.S. dollars and a growth rate of −16%. To alleviate the negative impact of financial crisis on the foreign trade, China adopted a series of incentive policies such as raising the export tax rebate rate and promoting trade facilitation. The development of international trade stepped into a high-quality phase since 2013. Although the growth rate of trade is still slow (negative growth in 2015 and 2016), the average annual growth rate of imports and exports in 2013-2018 is 1.8% and 2.4% (still higher than the global average of 0.8% and 0.5%) (Figure 1).

With the integration of China's economy into the world economy, foreign trade has grown rapidly. China's trade dependency also grew. China's trade dependency has gone through below three stages of development.

The first stage was from 1985 to 1990. With China's reform and opening up, exports grew gradually. In 1985, China's trade dependency was 22.7%. In 1991, China's trade dependency reached 33% for the first time. China's exports caught up and exceeded imports in this stage.

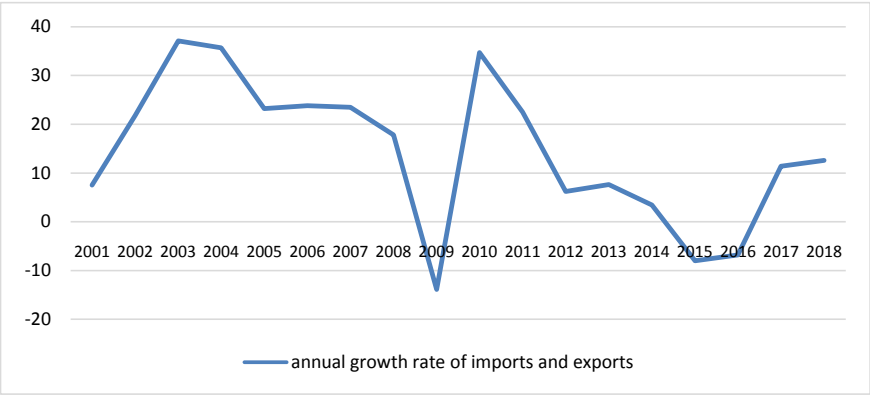

Figure 1. Annual growth rate of imports and exports in China. Source: CNKI database (2001-2018).

The second stage was from 1990 to 2000. In this stage, China had adopted a series of macroeconomic control measures to bring up the average annual growth of exports to 12.4%, exceeding the average annual GDP growth rate of 8.8%. The rise of labor-intensive industries and the development of processing trade had led to rapid growth in exports. Export dependency exceeded import dependency, which had steadily increased trade dependency in China. China's foreign trade dependency exceeded 40% in 1994. Although China's trade dependency had slipped in the four years from 1996 to 1999, it still hovered around 35% and reached 39% again in 2000.

The third stage was from 2001 to the present. With China's accession to the WTO, economic globalization was further deepened and the role of foreign trade in economic growth has become increasingly important. In 2004, China's total import and export trade exceeded the trillion-dollar mark, surpassing Japan and ranked third in the world. The growth rate of trade is much higher than the growth of China's GDP and the growth of global trade. China's trade dependency has increased rapidly, breaking through 50% in 2003, reaching 62% in 2005 and 64% in 2006. Later, it has been affected by China's economic transformation, domestic and foreign demand structural adjustments, and the international financial crisis. Since 2007, trade dependency in China has gradually declined, from 56% in 2008 to as low as 48% in 2011, only 6% higher than that of 2002 (**Figure 2**).

Trade dependencies also vary a lot across regions as the differences of economic growth across east, central and west regions in China have existed for a long time. Since the reform and opening up, not only the total economic volume of the three regions increased rapidly, but the gap between regions also increased significantly compared with the previous period. The first five years of the 1990s were when the gap widened most rapidly. In 1978, 11 provinces and cities on the east coast, 8 provinces in the center, and 12 provinces in the west accounted for 50.17%, 29.26%, and 20.57% of total GDP respectively. A pattern of 5:3:2 was formed. From 1990 to 1995, the proportion of GDP in the coastal areas of the country rose from 51.73% to 55.65% with an increase of nearly 4 percentages. The central region fell from 27.35% to 26.14%, a decrease of 1.21 percentages. The western region decreased from 20.92% to 18.21%, a decrease of 2.71 percentages.

Regions with higher levels of economic development are normally aligned with higher trade openness. In 1999, the trade dependency of 11 provinces and cities in the eastern coastal area was 64.47%. However, the figure for 8 provinces in the central region and 12 provinces and cities in the west were less than 10%, which is less than 1/6 of the eastern coastal regions. The trade dependency of the three most open provinces in southern coastal areas is 127.68%, among which Guangdong province has the highest trade dependency of 163.32%. In contrast, the figure for Henan province and Ningxia Hui Autonomous Region is less than 7%, which is at a very low level among 31 provinces and municipalities across the country.

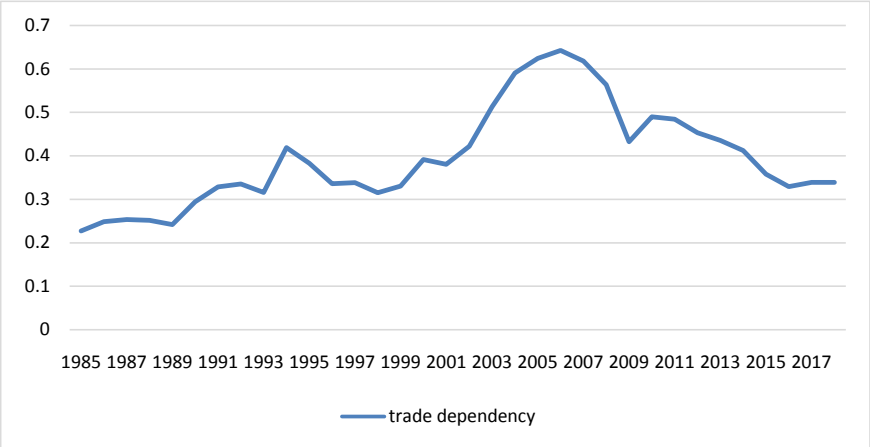

Figure 2. Imports and Exports/GDP in China. Source: National bureau of statistics (1985-2017).

2.4. Intergenerational Income Mobility in China

There is currently no consensus on the level and trend of intergenerational income mobility in China. Conclusions given by different scholars vary due to different micro data set used and different process methods applied.

Chen and Yuan (2012) calculated the intergenerational income elasticity in China from 1988 to 2005 by using the Chinese Household Income Survey (CHIPS) and China General Social Survey (CGSS) data and single-year income of the parent. The intergenerational income elasticity they calculated is characterized by a sharp decline and then to gradual stabilization. Xu (2015) calculated the intergenerational income elasticity of Chinese urban residents to be from 0.35 to 0.47. She analyzed the China Household Income Project (CHIP) and China Family Panel Studies (CFPS) data using a two-sample instrument variable. Wang and Yuan (2015) believed that there is a U-shaped trend of intergenerational occupational mobility and intergenerational income mobility of urban residents in China across different age categories and pointed out that educational inequality had an important impact on intergenerational mobility across different age groups. Li and Zhu (2015) indicated that China's overall social mobility is on the rise. However, it is more difficult for cross-class flow. Zhou and Xie (2019) found evidence that social mobility declined after China's transition from state socialism to a market economy. Despite the recent decline, they believe that China's social mobility is still higher than most developed market economies.

3. Data and Model Setting

3.1. Data and Its Processing

To conduct the empirical analysis on the relationship between trade openness and intergenerational income mobility, we gather data from both micro-level, which includes the individual income, education level, age, minority, gender

among many others, and macro level, which includes economic indicators such as trade openness, regional educational level and industrial level of a certain region.

For the micro-level data, we use China Health and Nutrition Survey (CHNS) with a wide range of individual variables including occupation, income level, marital status, age, gender, education level, health, etc. The survey covers 15 provinces and municipal cities (Beijing, Chongqing, Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shaanxi, Shandong, Shanghai, Yunnan, and Zhejiang) with different geographic and economic characteristics. The regional differences in economic development within China provide good support for our empirical testing. Unlike the international comparison, each province in China has a unified institutional framework and similar social environment. The effects of institutional and social environmental differences can be eliminated while analyzing the relationship between trade openness and intergenerational income mobility. The Survey data is available until 2015, therefore we use the data from survey year 1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011 and 2015.

Apart from the micro-level data, the macro-level data from Regional Statistical Yearbooks measure trade openness and control for other regional economic indicators that may affect intergenerational income mobility.

To combine the micro and macro-level data, we first use individual ID and father's individual ID to identify the child-parent pairs. Then individual data (including individual's province ID) is merged to the child-parent pairs based on individual ID, household ID, Wave and Province. Finally, we use province ID to allocate macro-level data to this data set.

After combining micro and macro data into a single data set, we ruled out some observations that may cause errors: 1) Those who are unemployed and those who are currently enrolling in school considering that these individuals' incomes are not typical; 2) Data from rural areas considering that the participation in trade among rural areas is so little that are not sufficient to be analyzed; 3) Minority nationalities since that preference or discrimination may occur for these groups.

Besides, considering the Chinese traditional value that males are supposed to earn money and raise the family while females are supposed to take care of the family, our model uses the father's income instead of the mother's income to measure the income of the previous generation. However, according to the Global Gender Gap 2020 released by the World Economic Forum, the labor force participation rate of females in China is 69% in 2020, which is only 14% lower than that of males. It is also important to study the intergenerational mobility of females in this phase. Thus, we also test income mobility for daughters. Considering that differences still exist between female and male employees, father-daughter and father-son relationships will be examined separately.

3.2. Model Setting

According to former literatures, a simple Probit model will be constructed following Ahsan and Chatterjee (2017):

$$Prob\left(IM_{ip}=1\right)=\phi\left(\alpha+\beta Openness_{p}+\gamma_{1}X_{i}+\gamma_{2}X_{p}+\varepsilon_{ip}\right) \quad (3)$$

where i represents child-parent pair; p represents provinces or municipal cities; the dependent variable IM_{ip} is the measurement of intergenerational mobility. There can be three explanations for IM_{ip}:

1) Upward mobility: IM_{ip} equals one if the child is in a higher income group than his father, otherwise it equals zero;

2) Downward mobility: equals one if the child is in a lower income group than his father, otherwise equals zero;

3) Mobility: equals one if the child is in a different income group from his father, otherwise equals zero.

The main explanatory variable is $Openness_{p}$ which measures the level of trade openness in a certain province or municipal city. For other factors that may affect intergenerational income mobility, X_{i} controls other individual-level variables and X_{p} refers to regional level variables.

3.3. Variables

In this paper, we use a method that is similar to transition metrics, which follows Ahsan and Chatterjee (2017). We use rank-rank mobility which divides people into 10 income groups. This measurement IM_{ip} as the explained variable is used to represent whether there is upward or downward income mobility between children and parents. IM_{ip} = 1 which represents upward income mobility if the child is in a higher income group than his or her parent and IM_{ip} = 0 if not, which represents downward income mobility.

Trade dependency, measured as the share of imports and exports in total GDP (IM + EX/GDP), will be used as the explanatory variable in this paper.

For individual-level variables, considering the fact the life-long average income is impossible to measure, we control the son's age and age squared, father's age and age squared to rule out the age effect on income (Blanden, 2013). Besides, household size is controlled for the potential differences in the allocation of resources among family members. Fathers' education is also controlled to rule out the potential influence of parents' education on income mobility (Chen & Yuan, 2012).

For regional level variables, the industrial situation and regional education level may affect intergenerational income mobility (Ahsan & Chatterjee, 2017). Thus, the share of primary industry in total GDP and the share of senior high school graduates will be controlled to rule out their potential effects.

3.4. Descriptive Statistics of the Variables

As mentioned above, one of the most popular methods to measure intergenera-

tional income mobility is transition matrices. Transition matrices for sons and daughters are also formed here to give a descriptive analysis. The transition matrices indicate the distribution of sons' income for fathers in a certain income group and the distribution of fathers' income for sons in a certain income group. As seen in the transition matrix, sons are more likely to stay in the same income group as their fathers, especially for those in the middle-income group such as in group 4, 5, and 6. Possibilities for sons in these income groups to stay the same income level as their fathers' reach over 40%, which represents high intergenerational income persistence. Also, although sons' income may be different from fathers' income, the change in income levels is relatively small and there is no individual staying in the 10th income group whose father is in the 1st income group (Table 1).

From the transition matrices for daughters, we also observe high-income persistence. The possibility for daughters in the 5th income group to stay at the same income level as their fathers is as high as 69.3% (Table 2).

From the descriptive statistics of the variables for sons, the average age for sons is 28.72 while the average age for fathers is 57.93. The average household size is 4.576. The level of trade openness varies a lot across regions with the lowest of 0.037 and the highest of 1.584. The large difference in trade openness allows us to analyze the effect of trade openness in intergenerational income mobility. Also, the education level for fathers is not so high with an average of 1.739, which is comparable with a lower middle school degree (Table 3).

For the data set of daughters, the average daughter's age is 24.74 and the average father's age is 54.24. Similar to sons, the average level of fathers' education is about lower middle school degrees (Table 4).

Table 1. Transition matrix for sons.

Fathers' income group	Sons' income group										Unit (%)
	1	2	3	4	5	6	7	8	9	10	Total
1	15	20	5	5	30	5	15	0	5	0	100
2	7.89	34.2	10.5	17.1	17.1	10.5	2.63	0	0	0	100
3	2.17	8.7	22.8	28.3	27.2	9.78	0	0	1.09	0	100
4	1.11	5.56	8.15	49.6	23	9.26	2.59	0	0.37	0.37	100
5	0.85	2.35	4.69	29.6	40.3	16.8	4.05	1.07	0.21	0	100
6	0.46	1.15	3.23	5.3	15.9	49.8	15.4	4.84	2.53	1.38	100
7	0.4	0.4	0.4	1.19	5.14	28.1	36	17	9.49	1.98	100
8	0	0	1.11	1.11	4.44	16.7	31.1	23.3	16.7	5.56	100
9	0	0	0	0	7.55	9.43	13.2	37.7	28.3	3.77	100
10	0	0	0	0	0	11.1	22.2	44.4	22.2	0	100
Total	1.19	3.96	5.1	19.3	21.8	24.3	12.8	6.46	4.02	1.08	100

Source: organized by the author.

Table 2. Transition matrices for daughters.

Fathers' income group	Daughters' income group										Unit (%)
	1	2	3	4	5	6	7	8	9	10	Total
1	0	0	0	0	100	0	0	0	0	0	100
2	0	33.3	0	33.3	0	0	33.3	0	0	0	100
3	0	0	33.3	0	0	33.3	33.3	0	0	0	100
4	0	4.65	6.98	30.2	34.9	18.6	4.65	0	0	0	100
5	0.65	3.92	2.61	13.1	69.3	9.15	1.31	0	0	0	100
6	0	2.4	0.48	4.33	39.4	43.8	7.69	1.92	0	0	100
7	0	0.55	0.55	3.3	9.89	23.1	46.7	15.4	0.55	0	100
8	0	0	0	0	0	0.75	24.1	50.4	19.6	5.26	100
9	0	0	0	3.45	0	0	20.7	34.5	17.2	24.1	100
10	0	0	0	0	0	0	25	12.5	50	12.5	100
Total	0.13	1.96	1.31	6.54	29.2	20.5	19.2	14.4	4.71	1.96	100

Source: organized by the author.

Table 3. Descriptive statistics for sons.

variable	explanation	mean	sd	min	max	N
imup	=1 if upward mobility; =0 otherwise	0.295	0.456	0	1	1766
imdown	=1 if downward mobility; =0 otherwise	0.300	0.458	0	1	1766
openness	trade dependency	0.249	0.322	0.0370	1.584	1766
hhsize	household size	4.576	1.378	2	12	1766
edu_f	father's education level	1.739	1.546	0	9	1766
age	child's age	28.72	8.067	16	65	1766
age2	square of child's age	889.7	542.9	256	4225	1766
age_f	father's age	57.93	9.367	28	89	1766
age_f2	square of father's age	3443	1136	784	7921	1766
edu	education level in the region	0.0030	0.0020	0.0010	0.0080	1766
industry	share of primary industry in total GDP	0.188	0.0980	0.00400	0.391	1766

Source: organized by the author.

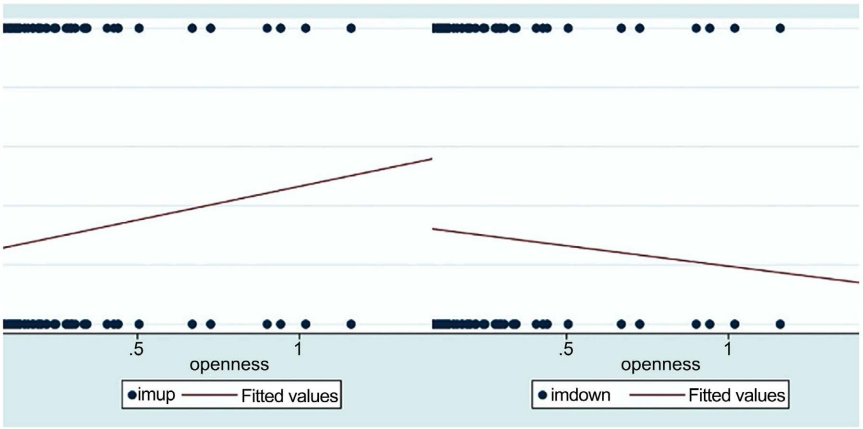

Figure 3. Relationship between trade openness and intergenerational income mobility (Sons). Source: organized by the author.

Table 4. Descriptive statistics for daughters.

variable	explanation	mean	sd	min	max	N
imup_fe	=1 if upward mobility; =0 otherwise	0.183	0.387	0	1	764
imdown_fe	=1 if downward mobility; =0 otherwise	0.338	0.473	0	1	764
openness	trade dependency	0.425	0.520	0.0460	1.641	764
hhsize	household size	4.385	1.416	3	12	764
edu_f	father's education level	1.927	1.598	0	6	764
age	child's age	24.74	6.445	14	55	764
age2	square of child's age	653.5	379.3	196	3025	764
age_f	father's age	54.24	8.347	31	82	764
age_f2	square of father's age	3012	952.4	961	6724	764
edu	education level in the region	0.0040	0.0020	0.0010	0.0070	764
industry	share of primary industry in total GDP	0.157	0.0940	0.00800	0.320	764

Source: organized by the author.

Figure 3 is a rough estimation of the relationship between trade openness and intergenerational income mobility to conduct a two-way scatter graph with a fitted curve obtained through quadratic regression. The curve on the left shows the relationship between trade openness and upward mobility using sons' data. The curve on the right shows the relationship between trade openness and downward mobility using sons' data. The results indicate that a higher trade openness level may be aligned with higher upward income mobility and lower downward income mobility.

It appears that similar trends also work for daughters that a higher level of trade openness may promote upward income mobility and hinder downward income mobility (Figure 4). Since this is just a descriptive analysis, we further investigate the patterns in the following empirical studies.

4. Results and Mechanism Analysis

4.1. Regression Results

The results of empirical analysis using the above model and data are shown below. Columns (1)-(3) are results tested with sons' data. Columns (4)-(6) are results tested with daughters' data. Columns (1) and (4) are results for upward income mobility. Columns (2) and (5) are results for downward income mobility. Columns (3) and (6) are results for all kinds of mobility (Table 5).

As shown in column (1), for sons, trade openness is positively correlated with upward intergenerational income mobility and significant at 1% level. Results in column (4) also show that higher trade openness is aligned with higher upward intergenerational income mobility for daughters at 5% significant level. Comparing column (1) with column (4), the effects of household size on upward mobility for sons and daughters are opposite. This may be due to the reason that

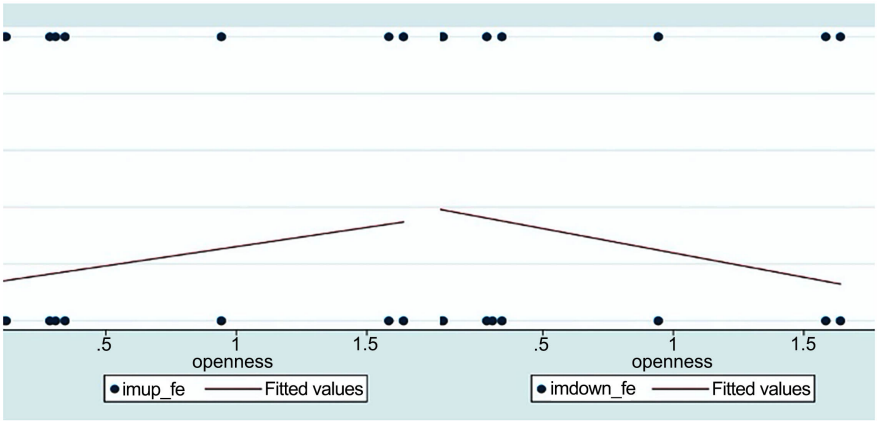

Figure 4. Relationships between trade openness and intergenerational income mobility (Daughters). Source: organized by the author.

Table 5. Results.

	(1)	(2)	(3)	(4)	(5)	(6)
	imup	imdown	im	imup_fe	imdown_fe	im_fe
openness	0.416***	−0.163	0.294**	0.525**	−0.537***	−0.007
	(0.143)	(0.154)	(0.139)	(0.221)	(0.197)	(0.184)
hhsize	0.058**	−0.022	0.032	−0.089**	−0.028	−0.083**
	(0.026)	(0.026)	(0.025)	(0.041)	(0.040)	(0.036)
edu_f	−0.149***	0.113***	−0.021	−0.057	0.093***	0.041
	(0.023)	(0.023)	(0.022)	(0.037)	(0.036)	(0.033)
age	0.119***	−0.105***	−0.002	0.175***	−0.112*	0.002
	(0.029)	(0.028)	(0.030)	(0.062)	(0.059)	(0.057)
age2	−0.001***	0.001***	−0.000	−0.003**	0.002	−0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
age_f	−0.036	−0.086**	−0.110**	0.012	0.002	−0.038
	(0.040)	(0.039)	(0.043)	(0.079)	(0.079)	(0.075)
age_f2	0.000	0.001**	0.001***	0.000	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
edu	38.175*	36.604	67.953***	35.720	5.092	13.641
	(22.926)	(23.014)	(22.174)	(56.582)	(48.265)	(45.559)
industry	−0.983	1.024*	0.239	2.243	−0.195	1.328
	(0.643)	(0.614)	(0.591)	(1.845)	(1.581)	(1.512)
_cons	−1.824*	3.470***	2.901***	−4.808**	1.805	1.059
	(1.068)	(1.027)	(1.088)	(2.144)	(1.909)	(1.818)
Obs.	1766	1766	1766	764	764	764
Pseudo R^2	0.079	0.052	0.013	0.096	0.061	0.011

Standard errors are in parenthesis ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Source: organized by the author.

when there is a large household with both son and daughter, the resources in the family may be allocated unequally with more resources to sons than to daughters given Chinese tradition. The effect of trade on downward intergenerational income mobility for sons is not significant as shown in column (2). However, results in column (5) indicate the higher trade openness may hinder downward mobility for daughters. For general income mobility, we observe in column (3) that trade openness is correlated with intergenerational income mobility for sons at a significant level of 5%. In column (3), we also find that the regional education level is positively correlated with intergenerational mobility at the significant level of 1% (Table 6).

More intuitively, we generate the predicted possibilities for values for trade openness from 0 to 2 in an increment of 0.2. As shown above in Table 6, the predicted possibilities for upward mobility for both sons and daughters increase as trade openness increases. On the contrary, the predicted possibilities for downward mobility decrease as trade openness increases. The above empirical analysis indicates that trade openness promotes upward mobility while restrains downward mobility.

Table 6. Predicted possibilities (Marginal Effect after Probit Modelling).

Delta-method				
Margin at (openness)	imup	imdown	imup_fe	imdown_fe
1	0.260	0.312	0.128	0.414
2	0.286	0.301	0.150	0.374
3	0.313	0.290	0.174	0.336
4	0.341	0.280	0.200	0.299
5	0.370	0.270	0.229	0.264
6	0.399	0.260	0.259	0.231
7	0.430	0.250	0.292	0.200
8	0.460	0.240	0.326	0.173
9	0.491	0.230	0.362	0.147
10	0.522	0.221	0.400	0.125
11	0.553	0.212	0.438	0.105

Source: organized by the author.

4.2. Robustness Check

Considering the survey data is collected from multiple waves, in order to rule out the effect of time and check if the results are still robust if we control the unoberserved differences in various waves, we include wave as dummy variables in the robustness check. The results are shown in Table 7.

Table 7. Robustness check with fixed time effects.

	(1)	(2)	(3)	(4)	(5)	(6)
	imup	imdown	im	imup_fe	imdown_fe	im_fe
openness	0.457***	−0.472***	0.059	0.372	−0.444**	−0.053
	(0.164)	(0.173)	(0.158)	(0.243)	(0.209)	(0.194)
hhsize	0.062**	−0.016	0.041*	−0.067	−0.052	−0.085**
	(0.026)	(0.026)	(0.025)	(0.048)	(0.041)	(0.038)
edu_f	−0.158***	0.116***	−0.025	−0.102**	0.102***	0.037
	(0.025)	(0.023)	(0.022)	(0.043)	(0.036)	(0.034)
age	0.115***	−0.100***	−0.001	0.155**	−0.095	0.004
	(0.031)	(0.029)	(0.028)	(0.073)	(0.061)	(0.057)
age2	−0.001***	0.001**	−0.0002	−0.002**	0.002	−0.00002
	(0.0004)	(0.0004)	(0.0004)	(0.001)	(0.001)	(0.001)
age_f	−0.032	−0.105**	−0.121***	−0.043	0.004	−0.045
	(0.043)	(0.041)	(0.041)	(0.093)	(0.080)	(0.075)
age_f2	0.0003	0.001***	0.001***	0.001	−0.0002	0.0004
	(0.0004)	(0.0003)	(0.0003)	(0.001)	(0.001)	(0.001)
edu	29.051	−103.086**	−58.563	−5.833	−1.580	7.710
	(39.526)	(41.346)	(38.704)	(60.866)	(48.372)	(46.208)
industry	−0.058	0.392	0.280	1.523	−0.192	1.105
	(0.761)	(0.727)	(0.683)	(1.999)	(1.592)	(1.528)
Constant	−2.267**	4.533***	3.447***	−2.816	1.731	1.372
	(1.136)	(1.093)	(1.072)	(2.307)	(1.959)	(1.842)
Obs.	1766	1766	1766	764	764	764

Standard errors are in parenthesis ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

From Table 7, we can see that the effect of trade openness to promote upward mobility for male and hinder downward mobility of female is still robust. However, the effect of facilitating upward mobility for female is diminished. The reasons can be due to the correlation between time and openness. Since the economic reform and opening-up of the Chinese market, the trade volume has increase with time. Also, the feminism movement in the 21st century can be a explanation for the upward mobility of female. Therefore, controlling time effects, the relationship between upward mobility and trade openness for female is not as significant.

For the baseline model, we perform probit model which uses an inverse normal link function as the link function and assumes a normal distributed errors to determine the likelihood that upward mobility would happen. To release this assumption, we use different models such as the Logit model and OLS to check the robustness. In logit models, logit link function is used and a logistic distribu-

tion of errors is assumed. Table 8 shows the results of logit model.

Table 8 indicates that the robustness check is in line with our baseline model. Moreover, a OLS model is also performed in Table 9, which shows similar results.

Table 8. Robustness check with logit model.

	(1)	(2)	(3)	(4)	(5)	(6)
	imup	imdown	im	imup_fe	imdown_fe	im_fe
openness	0.661***	−0.294	0.483**	0.972**	−0.889***	−0.011
	(0.236)	(0.262)	(0.224)	(0.414)	(0.331)	(0.294)
hhsize	0.097**	−0.036	0.051	−0.186**	−0.048	−0.132**
	(0.044)	(0.044)	(0.040)	(0.084)	(0.064)	(0.058)
edu_f	−0.249***	0.190***	−0.034	−0.134*	0.152***	0.066
	(0.042)	(0.038)	(0.035)	(0.072)	(0.058)	(0.053)
age	0.207***	−0.175***	−0.001	0.319**	−0.180*	0.004
	(0.052)	(0.047)	(0.046)	(0.125)	(0.098)	(0.089)
age2	−0.003***	0.002***	−0.0003	−0.005**	0.003	−0.00002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
age_f	−0.059	−0.143**	−0.181***	0.008	0.010	−0.061
	(0.071)	(0.067)	(0.067)	(0.161)	(0.133)	(0.119)
age_f2	0.001	0.001**	0.002***	0.0003	−0.0003	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
edu	61.605	62.565	110.308***	−0.988	11.243	21.654
	(38.992)	(39.022)	(35.827)	(112.041)	(77.495)	(73.271)
industry	−1.719	1.686	0.415	3.264	−0.225	2.125
	(1.099)	(1.037)	(0.945)	(3.601)	(2.551)	(2.418)
Constant	−3.184*	5.796***	4.759***	−7.673*	2.728	1.688
	(1.841)	(1.737)	(1.721)	(4.036)	(3.196)	(2.894)
Obs.	1766	1766	1766	764	764	764

Standard errors are in parenthesis ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 9. Robustness check with OLS model.

	(1)	(2)	(3)	(4)	(5)	(6)
	imup	imdown	im	imup_fe	imdown_fe	im_fe
openness	0.154***	−0.042	0.113**	0.159***	−0.162**	−0.003
	(0.047)	(0.048)	(0.052)	(0.054)	(0.067)	(0.073)
hhsize	0.019**	−0.007	0.012	−0.023**	−0.009	−0.032**
	(0.008)	(0.009)	(0.009)	(0.010)	(0.013)	(0.014)

Continued

edu_f	−0.046***	0.038***	−0.008	−0.017*	0.034***	0.016
	(0.007)	(0.008)	(0.008)	(0.010)	(0.012)	(0.013)
age	0.037***	−0.037***	−0.0004	0.039**	−0.038*	0.001
	(0.009)	(0.010)	(0.011)	(0.016)	(0.020)	(0.022)
age2	−0.0005***	0.0004***	−0.0001	−0.001**	0.001	−0.00000
	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0004)
age_f	−0.012	−0.028**	−0.040***	−0.012	−0.003	−0.015
	(0.013)	(0.014)	(0.015)	(0.022)	(0.027)	(0.029)
age_f2	0.0001	0.0002**	0.0004***	0.0002	−0.00003	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0003)
edu	12.950*	12.915*	25.865***	1.984	3.365	5.349
	(7.508)	(7.665)	(8.412)	(13.342)	(16.670)	(18.149)
industry	−0.270	0.365*	0.095	0.516	0.007	0.523
	(0.202)	(0.206)	(0.226)	(0.440)	(0.549)	(0.598)
Constant	−0.093	1.659***	1.566***	−0.263	1.178*	0.915
	(0.345)	(0.352)	(0.387)	(0.524)	(0.654)	(0.712)
Obs.	1766	1766	1766	764	764	764
R^2	0.093	0.063	0.018	0.092	0.073	0.016

Standard errors are in parenthesis ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

4.3. Mechanism Analysis

To better illustrate our regression results, we further investigated the two underlying mechanisms that may lead to such a relationship between trade openness and intergenerational income mobility. On the one hand, we examine whether the industrialization led by trade openness could explain the higher level of intergenerational income mobility. On the other hand, we study the role of upward educational mobility in bridging the two factors.

First, we investigate the role of industrialization in our baseline finding that trade openness affects upward education mobility. **Table 10** reports the results. Industrialization represents the share of manufacturing and service industry in the total GDP (calculated as 1-industry). We conduct the analysis based on community level with 128 observations in total, and find that trade openness effectively boosts the level of industrialization in the local community, with a point estimate around 14%. The findings corroborate with existing literature that developing countries would industrialize faster with the adoption of outward-oriented trade policies (Chow, 1987; Clark, Charles, & Sprinkle, 1999; Awokuse, 2008). The trade policies in China since the first open door policy in 1978 have rapidly evolved, especially in the early 21st century. China not only fulfilled its WTO commitments by revising trade regulations, reducing tariffs, opening up the service market, and lowering the foreign investment entry barriers, but also established Free Trade Areas along the coast for further trade

openness. This process greatly facilitated the emergence of export-oriented industries with waves of industrialization. On the other hand, the trade policies have greatly attracted foreign investment, especially from Japan, South Korea, and Southeast Asia in the late 20th century. These foreign companies also brought in technologies that flourished industrialization. Furthermore, the individual level analysis in Column (2) tests the relationship between industrialization and upward education mobility. The results show that industrialization effectively leads to higher level of upward education mobility, which is supported by previous literature that states industrialization has promoted equality of opportunity for it involves economic rationalization that places the emphasis on achievement in the allocation of occupational positions instead of ascription (Blau & Duncan, 1967; Zhou & Xie, 2019) (**Table 10**).

Table 10. Mechanism I: Industrialization.

	(1)	(2)
	industrialization	imup
openness	0.141***	
	(0.007)	
eduimup		
industrialization		1.706***
		(0.407)
hhsize		0.006
		(0.021)
edu_f		−0.118***
		(0.190)
age		0.156***
		(0.249)
age2		−0.002***
		(0.000)
age_f		−0.005
		(0.035)
age_f2		0.000
		(0.000)
edu		−16.021
		(18.144)
_cons	0.794***	−4.640***
	(0.010)	(0.943)
N	128	2530
Pseudo R^2	0.517	0.0770

Robust standard errors are in parenthesis ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Next, we hypothesize that trade openness increases the demand of high-skilled labor in the labor market which may have a potential effect on individual's choices of education, while education is often seen as a determinant of intergenerational income mobility in existing literature (Fan et al., 2021). A large number of empirical studies also showed that educational background is one of the main factors leading to differences in labor wages and income distribution (Li & Ding, 2003; Fortin, 2006). To further examine the effect of trade openness on education mobility and the relationship between education mobility and income mobility, an empirical analysis on trade openness and education mobility as well as the relationship between education mobility and income mobility is given as follows (**Table 11**, **Table 12**).

Table 11. Mechanism II: Upward educational mobility.

	(1)	(2)
	eduimup	imup
openness	0.737***	
	(0.083)	
eduimup		0.170**
		(0.781)
industrialization		1.527***
		(0.412)
hhsize	−0.144***	0.011
	(0.244)	(0.021)
edu_f	−0.700***	−0.085***
	(0.026)	(0.024)
age	0.132***	0.151***
	(0.034)	(0.025)
age2	−0.002***	−0.002***
	(0.001)	(0.000)
age_f	0.050	−0.007
	(0.044)	(0.035)
age_f2	−0.000	0.000
	(0.000)	(0.000)
edu	61.975***	−14.400
	(16.591)	(18.123)
_cons	−1.357	−4.572***
	(1.046)	(−4.84)
N	2530	2530
Pseudo R^2	0.3261	0.0787

Robust standard errors are in parenthesis ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 12. Heterogeneous effects of openness on upward educational mobility.

	(1)	(2)
	eduimup	eduimup_fe
openness	0.294*	0.727***
	(0.173)	(0.224)
hhsize	−0.048	−0.315***
	(0.030)	(0.051)
edu_f	−0.726***	−0.796***
	(0.032)	(0.055)
age	0.084**	0.310***
	(0.038)	(0.074)
age2	−0.001**	−0.005***
	(0.001)	(0.001)
age_f	0.017	0.125
	(0.050)	(0.099)
age_f2	−0.000	−0.001
	(0.000)	(0.001)
edu	1.179	103.049*
	(26.980)	(56.492)
industry	−3.234***	1.200
	(0.763)	(1.801)
_cons	0.863	−5.341**
	(1.278)	(2.358)
Obs.	1766	764
Pseudo R^2	0.327	0.388

Standard errors are in parenthesis ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

As shown above in Table 11 and Table 12, we first observe that there is a positive relationship between trade openness and upward education mobility. It is interesting that the correlation is found to be more significant in female than in male. One plausible explanation is that trade not only increases the demand of high-skilled labor that requires high level of education but also the demand for manufacturing labor with lower education level needed in China. Males have higher possibility of choosing those manufacturing occupations than female. Thus, the effect of trade on male's choices of education is smaller than that of female. Also, household size is having a significant negative effect on education mobility for daughters while not for sons. This may be due to the traditional values in Chinese family that sons will have more resources to gain higher education than daughters. In addition, for sons, the share of primary industry has a negative effect on sons' education mobility at the significance level of 1%, which also corroborates our hypothesis that higher demand of high skilled labor in the labor market may have potential effect on individual's education choice.

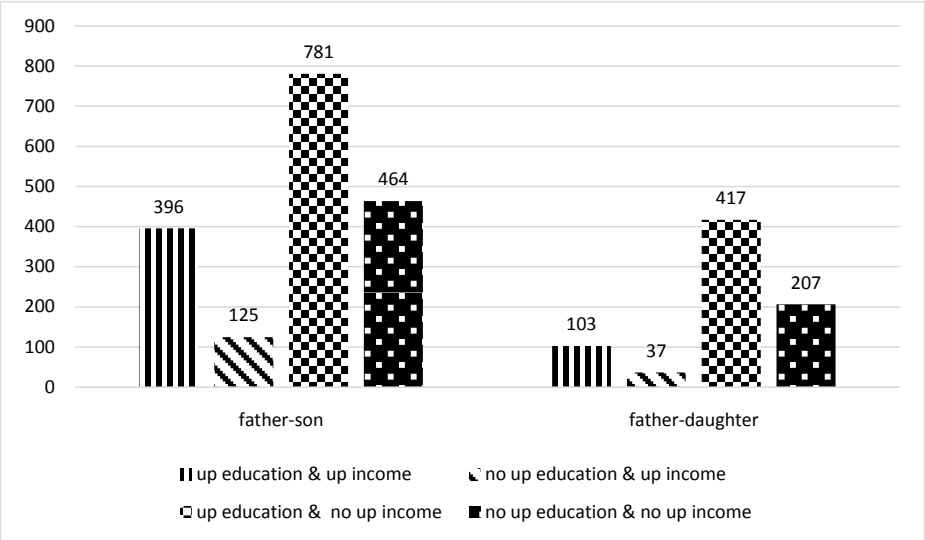

Figure 5. Education mobility and income mobility. Source: organized by the author.

Following the empirical results that trade openness has a positive effect on upward education mobility, a descriptive discussion is given on the relationship between upward education mobility and upward income mobility. From Figure 5 we could see that nearly 80% of sons with upward income mobility are also experiencing upward education mobility, while the figure for daughters is around 71.43%. To give a more concrete analysis, we conduct the probit regression on individual level. From Column (2) in Table 11, we observe that upward educational mobility is significantly positive correlated with the upward income mobility, even controlling micro and macro variables.

5. Conclusion and Policy Implications

5.1. Conclusion

In this paper, we study the relationship between trade openness and intergenerational income mobility by China Health and Nutrition Survey (CHNS) data, which is a comprehensive micro-level data set. We match the father-son and father-daughter into pairs and allocate the macro-level data from provincial yearbooks to those pairs. The empirical analysis based on the data combined with micro and macro level data indicates that higher level of trade openness may promote upward income mobility. The correlation is significant at 1% level for father-son pairs and 5% level for father-daughter pairs. In addition, higher level of trade openness may have the effect of hindering downward mobility. The effect is only significant for father-daughter pairs.

Most notably, we explore the mechanism that may explain the reason why trade openness may promote intergenerational income mobility. Trade increases the demand of high-skilled labor in the labor market, potentially influencing on individual's choice of education, which is often seen as a determinant of intergenerational income mobility in existing literature. Further empirical analysis on

the relationship between trade openness and upward education mobility shows that higher trade openness is aligned with higher upward education mobility, supporting our hypothesis that trade openness may have potential effect on individuals' choice on education. Additional discussion indicates that nearly 80% of sons and 71.43% of daughters with upward income mobility have also experienced upward education mobility.

5.2. Policy Implications

The potential effect of trade openness on promoting upward intergenerational income mobility sheds light on how policies can be developed to expand the positive effect of trade openness on intergenerational income mobility.

First of all, during the era of de-globalization with the trend of rising populism, protectionism and nationalism, China should keep up its process in reform and opening up through further eliminating trade barriers and strengthening international cooperation.

Secondly, tailored trade policy can be conducted to stimulate the development of industries with middle or high skilled labors. For instance, service outsourcing has created millions of jobs in India. Outsourcing plays an important role in providing job opportunities that require high-skilled labors like IT services and middle-skilled labors like customer services. The job opportunities provided by service outsourcing have led to an increase in wages of workers in the host country. For example, the boom of outsourcing in India has led to an increase of 15% of wages within a year. According to the forecast of neoIT[1], an American offshore outsourcing professional consulting company, the wages of the offshore outsourcing laborers in 2010 generally increased by nearly 50% compared with 2005. Also, compared with other manufacturing industries, the service outsourcing industry is a typical high-income industry. Policies to promote outsourcing can be conducted in areas with low trade openness to provide more opportunities for young labors to gain higher wages.

Besides trade policy, education policies need to be also implemented to facilitate the intended effect. From the above analysis, we found that most of the individuals with upward intergenerational income mobility also experienced upward educational mobility. Thus, trade policy itself is not sufficient to promote intergenerational income mobility. Additional education reform and policies are essential to expanding the effect of trade openness.

Since higher income for educated girls in the process of trade liberalization promotes upward income mobility and restrains downward income mobility, Chinese families should be encouraged to provide equal education opportunities for boys and girls. Meanwhile, policies to promote equal education should be implemented for providing individuals from different family backgrounds with equal opportunities of entering a high-skilled occupation. From this perspective, compensatory education policy can be developed. The compensation principle

[1]Global outsourcing consulting company.

of educational resource allocation concerns the gap of students' social and economic status and compensates students with disadvantaged social and economic status in the allocation of educational resources. Through the redistribution of educational opportunities, compensatory education policy helps to provide more opportunities to individuals in poor families and promote upward mobility for disadvantaged groups.

Finally, reskill and upskill policies are also important to increase the mobility of those who have already been employed. Government could initiate projects partnering with colleges and companies to reskill and upskill those low-skilled labors who may be replaced by automation. The reskill and upskill projects will also help those with limited resources during their childhoods to have more opportunities during their adulthood.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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