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Migration at the Provincial Level in China: Effects of the Economic Motivation and Migration Cost

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Abstract

Since 1978 when China relaxed the restriction om internal migration, thousands of millions of labors have moved from hometowns to other places in search of better jobs and higher incomes in 30 years. This study looks at the internal migration at provincial level from 1995 to 2000 and also analyzes how the different wages levels in different provinces or in rural and urban areas in the same province affect the migration. By looking at the percentage of migrants to the destination provinces (region) from the home province to the total migrants from the home province, the study assesses the to which extent the regional wage disparity affects the size of migration from 1995 to 2000.

Executive Summary

In this paper, I mainly estimated how the wage disparity between the home province and host province affect the migration population between 1995 and 2000 in China. I generated the result from the regression analysis and figured out the effect from the coefficient of the independent variable (the wage ratio between two provinces) in the regression equation. However, there are more than just one variable affect the migration population. Therefore, I needed to find other elements and put them into my regression equation to control their effect on the migration population. Through that way, the real effect of wages disparity between two provinces on the migration can be obtained.

Based on my analysis of the migration situation in China, I sorted the elements that can affect the migration into four types: the push factors in the rural areas of the home province, the pull factors in the urban areas of the host province, the economics benefit gained from migrating to the host province and the migration cost of migrating to the host province. The push factors include the arable land per capita and the gross output value in agriculture per capita for agricultural population, and the pull factors of the urban areas of the host province include the higher wage, the unemployment rate, the nonagricultural employment percentage, the fixed asset investment per capita and the government fiscal expenditure per capita. The economics benefit of migration is just the higher wage of the host province, which is already included in the pull factors. Also, the migration cost is the distance between the two provinces. In terms of the migration cost, apart from the distance between two provinces, I also consider the influence of the situation whether the two provinces share the same border or not and cases of inter- and intra- provincial migrations as people tend to move to the provinces which share the same border or just move within the home province. Therefore, I employed three regression analyses

in my research. For the first model to estimate the both inter- and intra- provincial migrations, I only put the wage ratio between the original place and the destination, the unemployment rate, the distance between two places and the dummy variables to estimate if the two provinces share the same border when it is the inter-provincial migration and the if it is the intra- or inter-provincial migration in my regression because the effect of other elements such as the fixed asset investment per capita will be offset in the intra-provincial migration as it won't be changed for people moving within one province. Therefore, I added two models to solely estimate those elements affect the migration in the inter-provincial migrations. After the coefficient of each element in the regression are obtained, I can conclude the effect of each element on the migration such as it is positively or negatively correlated to the migration population and how the value change of each element will change the migration population.

Also, the independent variable (wage) and the dependent variable (migration population) are both ratios as the total population in different provinces are different, so the estimation on the absolute value of migration population between two provinces are pointless. To eliminate the effect of different total population in different provinces, I employed the percentage of migrating population from the original place to the destination to the total population of the home province as the dependent variable and the ratio of the wage in the original place to the wage of the destination as the independent variable.

In my research, I analyzed the period between 1995 and 2000 and all the data are obtained from China Population Census. For some variables, the data for each year are available, but for other variables, it only has the data for one year as they are collected for every 5 years. Faced with this situation, I took the average of the data of 5 years to have the expected value to match with the data which are only collected for every 5 years.

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Background

During the period from the 1950s to the early 1980s, a rigid hukou (household registration) system was implemented in China. Hukou "identity" places people spatially. During that period, internal migration including rural-to-urban migration was controlled. Since the 1980s, the hukou system has been relaxed, and Chinese people including the rural residents were permitted to move to other places temporarily without changing hukou. Apart from the relaxation of the barrier to migration, the deepened reform and the rapid growth of the economics increase the demand for labors in urban areas. Therefore, since 1978, China has experienced a rapid and unprecedented process of urbanization, created by the largest flow of rural-urban migration in the world. The percentage of the urban population raised from 18% in 1978 to 54.7% in 2014. The rapid expansion of urban population is dominantly contributed by the floating population from rural areas (75%).

Table 1

Urbanization and rural –urban migration in China: 1978– 1999

Year	Total Population (10,000)	Urban population (10,000)	Urbanization growth rate	Urbanization growth in persons (10,000)	Natural growth growth in persons (10,000)	Net Migration growth in persons (10,000)
1978	96,259	17,250	17.92	582	144	438
1979	97,542	18,494	18.96	1244	144	1100
1980	98,705	19,139	19.39	645	158	487
1981	100,072	20,175	20.16	1036	200	835

1982	101,654	21,479	21.13	1305	228	1077
1983	103,008	22,270	21.62	791	206	585
1984	104,357	24,017	23.01	1746	210	1537
1985	105,851	25,094	23.71	1077	247	831
1986	107,507	26,366	24.53	1272	281	991
1987	109,300	27,674	25.32	1308	315	992
1988	111,026	28,656	25.81	982	313	669
1989	112,704	29,540	26.21	884	310	574
1990	114,333	30,191	26.41	651	306	345
1991	115,823	30,543	26.37	352	282	70
1992	117,171	32,372	27.63	1829	255	1574
1993	118,517	33,351	28.14	979	267	712
1994	119,850	34,301	28.62	950	269	681
1995	121,121	35,174	29.04	872	261	612
1996	122,389	35,949	29.37	776	264	512
1997	123,626	36,989	29.92	1040	322	718
1998	124,810	37,942	30.40	953	310	643
1999	125,909	38,893	30.89	951	289	662

The share of natural urban growth is defined as percentage of natural growth of urban population in total urban growth in persons. The remaining part of total urban growth is the share of net migration.
Source: These values were computed from the China Statistical Yearbook 2000

To see how much the migration contributes to the urbanization, we can decompose the annually urban population growth into two parts: the natural growth and the net urban

migration. The annual natural growth rate is equal to the difference between birth rate and death rate in that year.

Therefore, from the table one, we can know how much the increase of urban population is due to migrants by substracting the natural population growth from 1978 to 1999.

For the inter migration in China, there have been two periods. From 1978 to 1990, which is the first period, it is the beginning of high level of economic growth. However, the population movement was not very significant. In the second period from mid 1995 until now, high economic growth began associated with high rate of migration to cities. The migration was first along the coastal line and then spreading across cities. The number of inter-provincial migrants was 11.0 and 10.3 million in 1985-1990 and 1990-1995 periods respectively. It jumped by three times to 33.9 million in 1995-2000. It was 38.2 million in 2000-2005 (Leadership Team Office of State Council for National One Percent Population Sampling Survey and Department of Population and Employment Statistics of NBS, 2006)

In terms of the type of migration, it can be divided into two parts: intra provincial migration and inter provincial migration.

Inter Provincial Migration: Because of the imbalance of the regional economic growth in China, a large amount of migrants moves from the west (retarded inland region and middle region) to the east (advanced coastal region) (Figure 1). In 2010, 12 cities in China had more than two million migrants, and nine of these cities were located in the three major coastal megacity regions, namely, the Yangtze River Delta, Pearl-River Delta, and Beijing-Tianjin-Hebei Region. (Figure 2)Shanghai particularly involved the highest number of migrants (10.85 million).

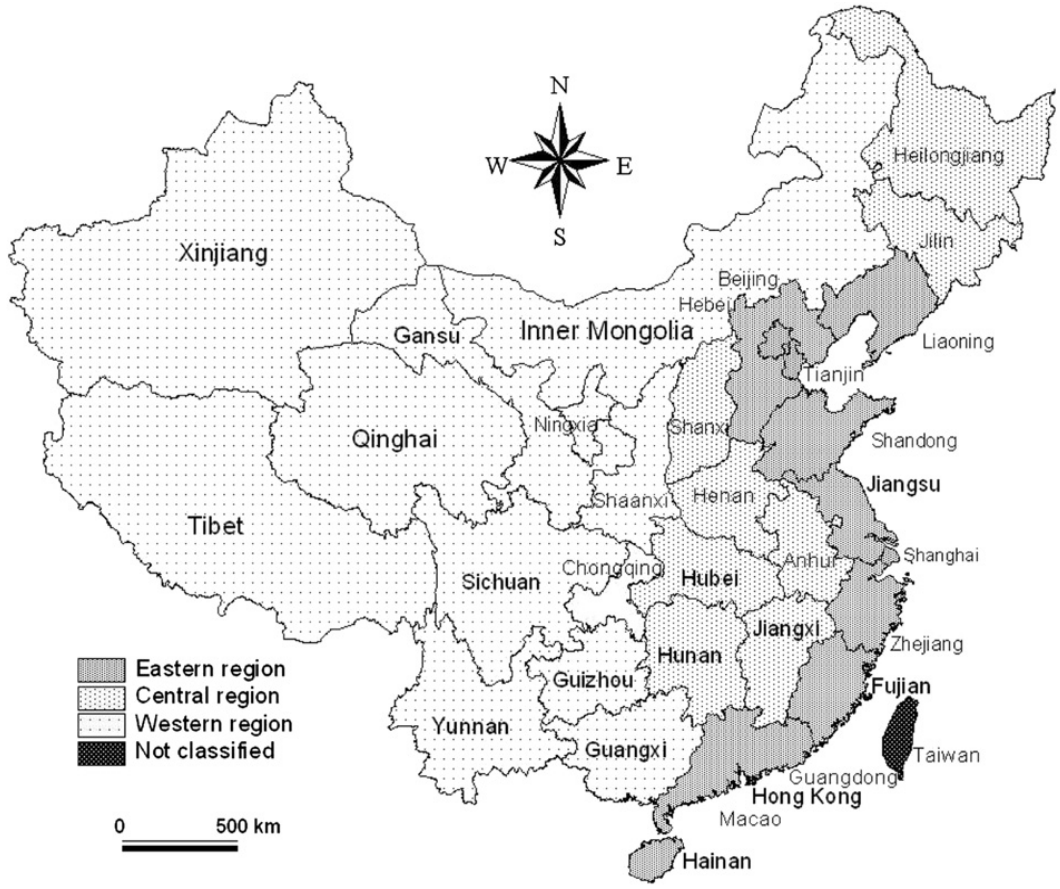

Fig. 1. Provincial regions in China.

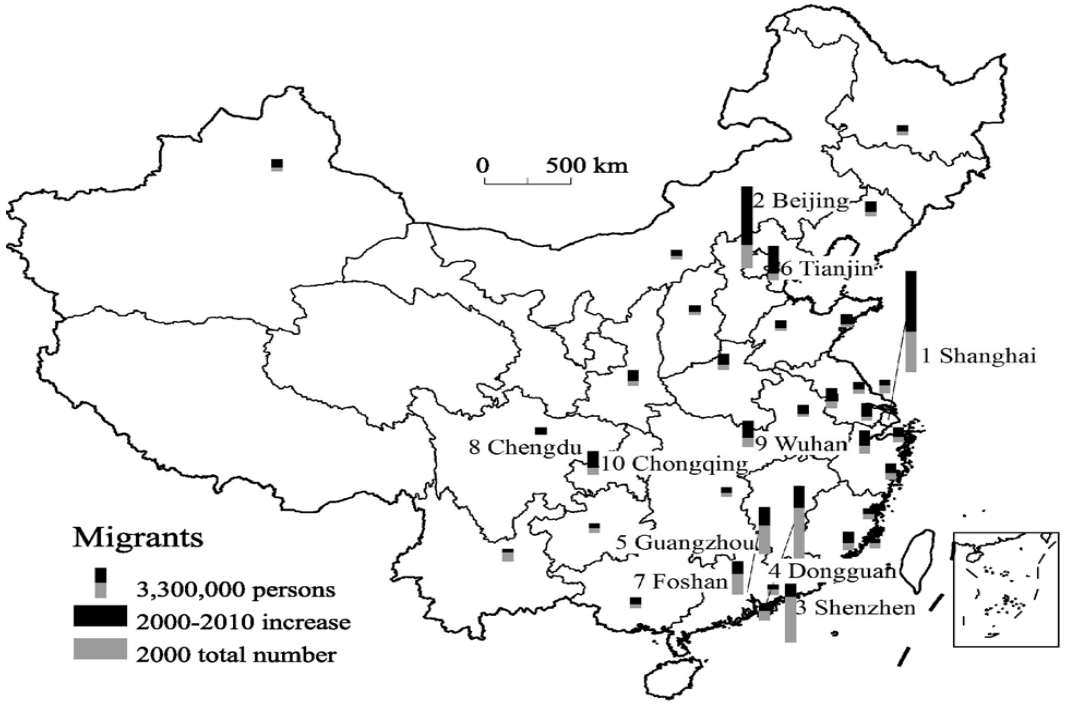

Figure 2 Cities

with more than 1 million floating population in ChinaSources: National Census 2000 and 2010 (Note: The number before a city is the rank of the city in floating population)

From the study of Kevin Zhang and Shufeng Song,The provinces that have largest emigrants are Sichuan (19% of the nation), Henan (14%), Anhui (11%), Hunan (8%), and Jiangxi (6%). They are also top five provinces in terms of inter province emigrants. The provinces that have largest immigrants are Guangdong (31% of the nation), Zhejiang (10%), and Fujian (6%).

Intra Provincial Migration: Migration from the rural areas or counties move to the urban areas or big cities within one province can be categorized as intra provincial migration. In 2000,

the amounts of migrants moving within a county, across counties but within a province, and across provinces were 65.60 million, 36.39 million, and 42.46 million, respectively. The intra-county migrants accounted for 45.4% of the total floating population in 2000. From 2000 to 2005, and the intra-provincial (inter-county) and interprovincial floating population increased by 132.8% and 101.4%. From the trend, it can be seen that the intra provincial migration is becoming an dominant track of migration in China as inter provincial migration poses a obstacle for migrants to settle down due to the hukou system. Compared with the inter provincial migration, intra provincial movement is more convenient, and also the distance of migration within-province is shorter than cross-provinces.

Research Statement

The purpose of this statement is to estimate the casual relationship between the wage of the destination place and the provincial-level migration from 1995 until 2000 in China. In the analysis, the dependent variable is defined as the percentage of number of migrants to one province (region within the original province) of the total labor movement from the original

province during 1995-2000. The independent variable is defined as the average wage of the destination province (wage ratio between the destination places and the original places within one province for intra-provincial migration or two provinces for inter-provincial migration). Controlled variables include cost of moving to the destination province(distances), unemployment rate of the host province, arable land per capita, gross output value agriculture, non agricultural industry percentage, fixed asset investment per capita, fiscal expenditure of local government per capita and the dummy variables are created to control whether it is intra- or inter-provincial movement or if the two province share the same border. Most of the data are from China population census at 1995, 2000 at the provincial level.

(There are two regression models in the study, one of which is to estimate the effect of wage of the destination on the inter-provincial migration and the other is for how the proportion of the wage of the destination province out of the wage of the original province influences the both inter- and intra-provincial migration. Therefore, there are two parts in the statement, and the content in the parenthesis is for the model of intra- and inter-provincial migration.)

Research Questions

1, Does the wage of the destination affect the migration population significantly? Is the number of migrants mainly due to the income level of the places they are moving to?

2, For the inter-provincial migration, how does the pull-factors in cities and push factors in rural areas affect the migration?

3, Compared with Poncet's study from 1985-1995, how does the impact of the borders, types of migrations and distance on migration change from 1995 to 2000?

Theoretical Framework

As the internal migration in China is dominantly contributed by the rural-urban migration, so I focus my analysis on the migration from rural areas to cities and consider the issue mainly from the perspective in rural-urban migration.

Model:

1) Harris-Todaro Model

Todaro's model is a model used in development economics to explain some issues in rural-urban migrations

The main assumption is that the migration decision is made based on the expected income differentials between the rural and urban areas rather than the actual wage differentials.

Therefore, if the expected wage in urban areas is higher than the income in rural areas, even though there might be a high urban unemployment, the rural to urban migration is economically rational

The basic idea is that suppose that the urban wage is w and the rural marginal product of labor (rural wage) is w_r (w_r <w)and Suppose there are L workers in the economy, with L_m and L_r being the numbers employed in the modern and rural sectors. The assumption is that the rural workers base their migration decision on their expected incomes. The expected urban income is determined by multiplying w by the probability of finding a job there, which the model assumes to be equal to the rate of urban employment, $L_m/(L-L_r)$. Hence, as long as $w*(Lm/(L- Lr)) > wr$, there will be rural-urban migration.(Basu,1984)

This model explains why the wage of the urban areas(destination) and rural areas (original region) and unemployment rate in urban areas(destination) should be considered if we want to analyze what determines the migration.

Therefore, it can also be applied to China's migration that a large amount of labor transfer from traditional agricultural sector in rural areas where the productivity is low to the modern manufacturing sector where the productivity is higher. This model explains the internal migration in China as the wage is the primary drive for migration from rural to urban areas and the unemployment in cities(destination) also counts for the migration.

2) Crozet's geographical economic model (This framework emphasizes the role of access to markets in regional dynamics)

Market Potential$_i$ = PR $_j$=1 ($Y_j/d_{i,j}$) (R is the number of locations within the relevant area, Y_j the economic size of region j, and $d_{i,j}$ is the geographical distance between locations i and j (i, j $\in$ [1, R]).)

From the model, it can be concluded that the market potential one region is not jut dependent on the economic size of this region that is directly with the market but also on the distance representing the cost of getting access to the market.

3)Interpretation of Crozet's model in Poncet's study

When the model is used in the labor market, we can know what affect a labor's decision to migrate to another place to find a job. From this model, apart from the benefit, the migration cost is also included when considering what affects the migration decision. The economic size of region represents the level of wage and how many jobs it could offer, which is the possibility

of finding a job. The distance is just geographical distance between the original place and the destination. We consider a mobile worker k from province j and his location decision among R provinces (including j). Migrants choose their destination through the comparison of the perceived quality. Therefore, the migrants' decision is based on: migration cost (distances), the expected real income, and the probability of finding a job.

In Poncet's study, in terms of distance, she investigates the various cost components that discourage migration with d_{ij} denoting the distance between the original province and the host province. Proportional distance costs typically include the physical costs of moving that increase with distance, reductions in the amount of information as distance increases, and networks of contacts and support based on past migration flows (Helliwell, 1998). Thus, the dummy variables F_{ij} and I_{ij} are introduced in the test. For the dummy variable $F_{ij,}$ which is equal to 1 if the province i and j share the same border, we test if the migration cost is mitigated if the two provinces share the same border and also if the neighboring province is more attractive for migrants due to the similar dialects, living habit and local culture. In terms of dummy variable $I_{ij,}$ which equals 1 if i and j are the same province, it is based on our anticipation that the extra cost will be added to migrants who move out the original province. The reasons are similar to the reason of creating dummy variables for neighboring provinces, as the migrants move out their original province, they need more time to adjust to new environment, habits and policies besides the distance is longer than intra-province migration. Therefore, in my regression model, I also use these two dummy variables according to Crozet's model and Poncet's study.

Interpretation of Variables

The migration is simultaneously affected by the push factors in rural areas and pull factors in pull factors in urban areas. Also, the migration decision is made based on the benefits and costs. Thus, the variables in the regression are considered based on these four aspects: push factor in rural areas, pull factors in urban areas, migration benefits and migration costs. What to be noted is that some variables might be overlapped in more than one aspects such as the higher wage level in the urban areas belongs to the pull factor in urban areas and also the migration benefits.

1) **Push Factor in Original Province (Rural Areas)**

From Harris-Todaro Model, it is concluded that migration from rural areas to urban areas will increase if agricultural productivity decreases, lowering marginal productivity and wages in the agricultural sector (w_r), decreasing the expected rural income. To measure the elements that affect the agricultural productivity and rural income, I use the arable land per capita and gross output value in agriculture.

***Arable land per capita*:** In recently years, the arable land in China is declining due to the overuse of fertilizers, deforestation and sale of land for industry. It is a problem for rural household as it will threaten the income and also creates the problem of surplus labors. Thus, this generate a powerful push to migrate to seek for jobs in cities to supplement the income.

***Gross output value in agriculture (per agricultural capita)*:** The gross output value in agriculture (Farming, Forestry and Animal Husbandry) is directly connected to farmers' income and profit. If the gross output value in one region is lower, then the farmers are more likely to migrate to cities to earn more to afford their own families.

2) **Pull Factors in Destination Province (Urban Areas)**:

In Harris-Todaro Model, the migration from rural to urban areas increase as the expected income in cities is higher than in rural areas. Therefore, the wage disparity between the original province and the host province, which demonstrate how much more income migrants can earn from migration is the main pull factor in urban areas and is also the independent variable in the regression.

Also, in Crozet's geographical economics model, the labor market potential, which means how many labors a place can attract, is dependent on the economic size of this region. Here, the economic size of this region is interpreted as the employment and labor capacity. Therefore, I analyze the elements that can affect how many jobs a region can offer to migrants. Furthermore, the attractiveness of a region is also a pull factor for migrants. In terms of the attractiveness of a place, the two main factors---allocation of economic resource and the government investment exert fundamental impact on it.

Higher Wage (Independent variables): From Todaro's model, it is the primary reason for migrants move to cities as they are seeking a better life through a higher wage.

Unemployment Rate**:** it is the direct index that shows the probability of finding a job in destination location,

Non agricultural employment**:**

a) the employment opportunities reflect the possibilities that migrants can find jobs and how many migrating labors a region can accommodate.

b) the scale of nonagricultural industries is also related to the wage level as higher percentage of nonagricultural industries denotes this region is more developed and modern.

Fixed Asset Investment (per capita)**:** Fixed asset investment refers to any investment within the measurement period in physical assets, such as real estate infrastructure, machinery, etc.

Allocation of economic resource like government investment has a fundamental impact on the attractiveness of the cities. Higher fixed asset investment shows that the cities have a higher administrative level and thus have a superior advantage in the acquisition of land quotas and the process of project approval. More land and projects lead to more jobs available to migrants(Liu,2015).

Government Fiscal Expenditure (per capita): The governmental fiscal expenditure is also called government spending. The money spent is to supply public goods such as defense, bridge and roads and also merit goods like hospitals and schools. It is an effective variable that reflects the government's role in economic development, which is also related to the administrative level of government, the attractiveness of cities and availability of jobs.(Liu, 2015)

3) **Migration Benefits:**

Higher Wage in Destination Location: the higher expected wage is the primary drive fro migration according to Harris-Todaro Model.

Here, I only take the higher wage as the only benefit for the migration because in China, due to the existence of hukou system, migrants are not able to enjoy the same rights as the local residence. Especially for those labors from rural areas, their living quality in cities is lower than the average living standard. The other benefits from migration can be ignored according to living situations of the migrating labors from rural areas.

4) **Migration Cost**:

Distance

From Poncet's study, it is stated that proportional distance costs typically include the physical costs of moving that increase with distance, reductions in the quality and amount of information as distance increases, and networks of contacts and support based on past migration flows. The

migration costs are positively correlated with the distance and the cost increases as migrants move further away.

Three ways to estimate migration cost:

a) the absolute distance between the departure and destination locations

b) Whether the two provinces share the same border (moving to a province which share a common border with the original province is less costly than moving to a further away province. Also the financial and moral cost that might affect migrant's wage and satisfaction will be lower if the two provinces share the same border). We want to test whether the cost will be mitigated if the original location and the destination belong to neighboring provinces.

c) Inter-provincial or Intra-provincial (Inter-provincial migration has added cost than the Intra-provincial movement as it is further away than the Intra-provincial movement)

Hypothesis

1, I predict that the wage of the destination is positively connected with the number of migrants and the effect is significant. The higher the average wage of the destination is, the more migrants the host province (urban areas within one province for intra-provincial migration) can attract from the home town.

2, I predict that the impact of the push factors in the rural areas of original province (arable land and gross value of the agricultural output per agricultural capita) is negative, and pull factors in urban areas of the destination province (nonagricultural employment, fixed asset investment per capita and the government fiscal expenditure per capita) have positive influence on the migration.

3, I predict that the effect of migration cost (distance, borders, and inter-or intra- provincial migration) will still be strong and negatively with the migrating populations, compared with the study of Poncet's. It means that migrants tend to move in short distance and more likely to move within the original province or those sharing the same borders with their own provinces

Econometric Methodology

The regression starts with the general model derived from gravity model of trade and let

$$\ln NetMig_{ji} = a_j + b_1 \ln Wage_i + b_2 \ln Wage_j + b_3 \ln UnEmp_i + b_4 \ln UnEmp_j + b_5 \ln Land_i + b_6 Land_j + b_7 \ln FixedInv_i + b_8 \ln FixedInv_j + b_9 \ln GExp_i + b_{10} \ln GExp_j + b_{11} \ln AgOutput_i + b_{12} \ln AgOutput_j + b_{13} \ln NonAgEmp_i + b_{14} \ln NonAgEmp_j + b_{15} \ln Distance_{ij} + b_{16} CommonBorder_{ij} + e_{ij}$$

$$(\ln NetMig_{ji} = \ln Mig_{ji} - \ln \Sigma Mig_{ji})$$

In this model for inter-provincial migration, ΣMig_{ji} is the summation of population engaged in the inter-provincial migration from one province, which means that the population of intra-provincial migration has been subtracted from the total migration population from one province.

The Poncet's model imposes the exclusion restrictions as $b_2=b_4=b_5=\ldots\ldots\ldots b_{14}=0$

,but adds Internal dummy to account for type of migration.

$$(\ln NetMig_{ji} = a_j + b_1 \ln Wageratio + b_2 \ln UnEmp_i + b_3 \ln Distance_{ij} + b_4 CommonBorder_{ij} + b_5 Type + e_{ij})$$

$$(\ln NetMig_{ji} = \ln(Mig_{ji}/\Sigma TMig_{ji})$$

In Poncet's model for both inter-and intra-provincial migration, $\Sigma TMig_{ji}$ is the total migration population from one province that include two types of migration.

After estimating how the migration cost resulted from distance, border effect and types of migration affect the migration population, we derive a simplified and preferred model from general model in order to better estimate how the pull factors in the urban areas and push factors in the rural areas exert an influence on the population of net migration in each original province.

$$\ln NetMig_{ji}=a_j+b_1\ln Wage_i+b_2\ln Wage_j+b_3\ln UnEmp_i+b_4\ln Land_j+b_5\ln FixedInv_i+b_6\ln GExp_i+ b_7\ln AgOutput_j+ b_8\ln NonAgEmp_i+ b_9\ln Distance_{ij}+b_{10}CommonBorder_{ij}+e_{ij}$$

Explanation of variables:

J: the original province I: the destination province

NetMig$_{ji}$: $\frac{MIGji}{\sum MIGji}$ *(the ratio of the migrating population from original province j to the destination province i to the total migrating population from original province j)*

Wage: the average wage of the province

UnEmp: the unemployment rate

NonAgEmp: the nonagricultural employment

Distance$_{ij}$: the distance between the original province j to the destination province I (measure the distance between the two capital cities for inter-provincial migration and $2/3\sqrt{surface\ area/\pi}$*) for intra-provincial migration)*

CommonBorder$_{ij}$: dummy variables (=1 if two provinces share a common border and =0 otherwise)

Type : dummy variables (=1 if migration is in the same province which means that i=j and 0 otherwise)

Land : the arable land per agricultural capita

FixedInv : the fixed asset investment per capita

GExp :Governmental fiscal expenditure per capita

AgOutput : gross output value in agriculture (per agricultural capita)

There are some unobservable elements that both affect the outcome gap and the number of rural-urban migrating labors such as policies and natural resources. Also, inverse Effect also exists as the migration can also affect the income level of one city. Therefore, IV Regression is needed.

Instrument: the average wage in the past (in the year of 1990)

Reason: The wage in the past will affect the current wage right. However, if the past of the wage is further away, then it won't affect the decisions of current migration.

For example, I will use the wage level in 1990 to be my instrument for the analysis for 1995-2000. Decisions on migration might be affected by the wage of cities in 1994 or 1993, but it is not that possible to be influenced by the wage level 5 years ago.

Data

Data description

	Source	Methods	Units	Notes
ln $\frac{MIGji}{\sum MIGji}$ (dependent variable)	China National Census Data (Population by Current Residence and Registered Permanent Residence in Other Province)	From the data, we can get the population from the original province to another province. Then, we take sum of all the migration population to each province from the original province to get the total migration population from the original province.	100,000 persons	In order to know the flow of migrants, for example, from 1995 to 2000, I will subtract the number of the migration population in 1990 from the number of migrants in 1995.
wage (independent variable)	China yearbook database (average wage of staff and workers by regions)	From the dataset, we can obtain the average wage in the original and the destination province at one year For intra-provincial migration, the wage ration will be the average wage in cities over that in rural areas.	1,000 Yuan	As we estimate the period for 5 years from 1995 to 2000 In terms of the average wage, I will take the

		For inter-provincial migration, the wage will be the average wage in each province		average of the wage for 5 years in one province to estimate.
UnEmp	National Census data and China year book (Status of Non-working People of Province, Municipality and Autonomous Region by Sex) (Employment by Urban and Rural Area)	As I can't find direct unemployment rate in the data. Therefore, to get the direct unemployment rate of the host province. However, from the census data, I can get the total number of people who lose job but look for job and those who are waiting for the allocation because of the production stop and bankruptcy. Then I can divide it by the labor force to get the unemployment rate	10,000 person	From the National Census Data, the non working people includes students, people who are not in work but never found a job, retired people and so on
NonAgEmp	China Yearbook Database(Employed Persons by Industry)	Summation of employed persons in secondary and tertiary industry divided by the total number of employed persons)	1000 persons	
Dummy variables: *CommonBorder*$_{ij,}$ *Type*		*CommonBorder*$_{ij:}$ *(=1 if two provinces share a common border and =0 otherwise)*		

		Type: (=1 if migration is in the same province which means that i=j and 0 otherwise)		
Distance$_{ij}$	China Yearbook Database	Inter-provincial distance: distances between their capital cities Intra-provincial distance: If we hypothesize a disk-shape and a homogeneous distribution of population, the average distance is equal to *2/3* $\sqrt{surface\ area/\pi}$ (Head and Mayer, 2000)	Inter-provincial distance: 1 km Intra-provincial distance (area): 1km^2	
Land	China Yearbook Database (statistics for agriculture by region)	$\frac{Cutivated\ Area}{Total\ number\ of\ rural\ labors}$	Cultivated Areas: 1000 hectares total number of rural labors: 10,000 persons	The average of five years.
FixedInv	China Yearbook Database (Total Investment in Fixed Effect by Region)	$\frac{Total\ investment\ in\ fixed\ asset}{Total\ population}$	Total investment in fixed effect by region: 100 million yuan	The average of five years

			Total population: 1 million persons	
GExp	China Yearbook Database (Governmental Finance and Banking, Revenue and Expenditure by Region)	$\frac{Local\ expenditure}{Total\ population}$	Local expenditure: 100 million yuan Total Population: 1 million persons	The average of five years
AgOutput	China Yearbook Database (Gross Output Value of Farming, Forestry, Animal Husbandry by Region)	$\frac{Total\ output\ value\ in\ agriculture}{Total\ number\ of\ rural\ labors}$	Total output value in agriculture: 100 million yuan Total number of rural labors: 10,000 persons	The average of five years

I use the data from the National Census of 1995, 2000. Similar to Poncet's study, I obtain the matrices of aggregated migrations between and within Chinese provinces over one period 1995-2000. Both intra-provincial and inter-provincial migration data are available in the national census data. In my study, I drop Chongqing and Tibet. Chongqing is abandoned as it was not established until 1997. Therefore, the data of all variables for Chongqing are from 1998 to 2000,

and it is not accordance with data for other provinces. Also, Tibet is special for very few migrants moving to Tibet due to the extreme weather and very low economic levels.

Furthermore, there are some problems with the data. Firstly, we know which province the migrants are from, but the exact location they come from is not known from the dataset. Also, we are not able to figure out how many are from rural areas and the main reasons behind the migration. However, as the majority (over 90% from the National Survey 1995-2000) of the migrants are from rural areas, so the percentage of nonagricultural migrants is supposed to be small and is ignored in the study.

The second problem is that no data is available on when the migration took place. As the census is taken every five years, we only know how many migrants move during five years, and we are not able to get the data of migration population for each year. Therefore, for the rest variables whose data are documented for each year in China's Year Book, we can only take the average of five years to be matched with the data of migrating population in National Census Dataset.

Results

Table 1: Inter- and Intra- Provincial migration

Variable	Migration	Migration	Migration
lnwageratio	1.832***	2.253***	2.396***
	(0.165)	(0.161)	(0.157)
lnUnEmp	-0.123	-0.203***	-0.168**
	(0.0818)	(0.0778)	(0.0754)
lndistance	-1.639***	-1.265***	-0.870***
	(0.0574)	(0.0663)	(0.0827)
Type (Inter- or Intra)		2.650***	2.720***
		(0.270)	(0.261)
border			1.050***
			(0.139)
Constant	-9.889***	-16.30***	-20.64***
	(1.488)	(1.552)	(1.607)
Observations	841	841	841
R-squared	0.576	0.621	0.646

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

wageratio= $wage_i/wage_j$

For the same province, the $wage_i$ is the average wage in urban areas and $wage_j$ is the average wage in the rural areas

Table 2: Preferred Model (inter-provincial migration)

VARIABLES	Migration (OLS)	Migration (IV)
$lnwage_j$ (orginial)	-0.890	-1.100
	(0.760)	(0.766)
$lnwage_i$ (destination)	2.741***	3.798***
	(0.384)	(0.948)
lnUnEmp	-0.122	0.0600
	(0.130)	(0.197)
lnNonAgEmp	0.613*	0.472
	(0.313)	(0.329)
lnAgOutput	-9.362***	-10.04***
	(2.909)	(2.910)
lnland	-4.173***	-4.502***
	(1.328)	(1.332)
lnFixedIn	0.603***	0.299
	(0.217)	(0.328)
lnGexp	-1.209***	-1.430***
	(0.188)	(0.259)
lndistance	-0.714***	-0.726***
	(0.0884)	(0.0873)
border	1.175***	1.160***
	(0.137)	(0.135)
Constant	49.01*	50.16**
	(25.46)	(25.01)
Observations	812	812
R-squared	0.579	0.575

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The instrument for two-stage IV regression is the natural log of the average wage of destination in the year of 1990

Table 3: General Model (inter-provincial migration)

VARIABLES	Migration (OLS)	Migration (IV Regressio)
$lnwage_j$ (original)	-1.363*	-4.192***
	(0.733)	(1.232)
$lnwage_i$ (destination)	3.890***	17.26***
	(0.552)	(3.780)
$lnUnEmp_i$ (orginial)	-0.725***	0.363
	(0.145)	(0.356)
$lnUnEmp_j$ (destination)	-0.112	-5.056
	(2.691)	(3.744)
$lnNonAgEmp_i$ (destination)	1.310***	0.904**
	(0.310)	(0.417)
$lnNonAgEmp_j$ (original)	-1.912	4.062
	(4.169)	(5.645)
$lnAgoutput_j$(original)	-0.911	0.177
	(0.793)	(1.070)
lnAgoutput (destination)	1.333***	2.106***
	(0.154)	(0.293)
$lnland_j$ (original)	0.606	1.282*
	(0.568)	(0.759)
$lnland_i$ (destination)	0.141	2.000***
	(0.104)	(0.534)
$lnFixedInv_i$(destination)	-0.569**	-2.940***
	(0.247)	(0.732)
$lnFixedInv_j$(original)	2.873**	2.017
	(1.424)	(1.858)
$lnGexp_i$ (destination)	-0.736***	-4.616***
	(0.256)	(1.127)
$lnGexp_j$(original)	-0.916	2.898
	(2.120)	(2.942)
lndistance	-0.821***	-1.317***
	(0.0879)	(0.178)
border	1.062***	0.552**
	(0.133)	(0.223)
Observations	812	812
R-squared	0.616	0.325

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The instrument for two-stage IV regression is the natural log of the average wage of destination in the year of 1990

Interpretation of the Result

Independent Variable (Key Variable):

From the result of the three models, it can be seen that the effect the wage of and original destination provinces is as what is expected. In the result of Poncet's model, the coefficient of wage in the destination province is almost 2 in the primary regression without adding dummy variables for common borders and types of migrations, and the coefficients of the following two models are over 2. In both general and simplified models, the coefficients of wage are large enough. In the preferred model, the coefficient is 2.74 in OLS regression, which denotes the increase of one percent of the wage in the destination province will induce 2.74% migration increase to that province. Moreover, the coefficient increases to 3.798 in the IV regression, and

it shows the bias is dragged down by the IV. Similar to preferred model, the coefficient of wage of the host provinces dramatically jumps from 3.89 (OLS) to over 17 in the IV regression. Therefore, it can be concluded that wage of the destination province is a statistically significant variable and positively related to the migration. It shows that the wage or the economic benefit are the key pull factor in China's labor migration. The expected sign and the significance of the result emphasizes that the migrants tend to move to places where they can get higher income differentials. For rural workers, they have a greater responsiveness to the economic conditions as they are looking for jobs and higher wage in urban areas when faced with the huge wage gap between urban and rural areas.

For the wage of original province, it is only estimated in the general model. From the result, coefficient (-1.363) for the OLS regression, though negative as expected, is not very statistically significant. However, it becomes more significant in the IV regression. This result is reasonable as the low wage in the original province can be seen as a factor to push migrants move to a place with higher wages.

Push Factors in Rural Areas*:*

Also, as expected, the arable land per agricultural capita in home province is negatively correlated to the migrating population and has a significant effect on migration. Especially in the preferred model with both OLS and IV regression, the coefficients are around -4 and and standard errors are just 30% of the coefficients. The less land they have, the more willing they are to migrate from rural areas to cities within or out of their original province. Now the rural areas in most China's provinces especially in the west are faced with a serious problem of low arable land per capita due to the increase of agricultural population and the more serious destroyed land resources such as desertification, stony desertification and salinization.

Similar to the arable land per agricultural capita, the gross output value of agriculture product per capita in original province has a negative coefficient both in the general and preferred model. In the simplified model, -9.362 in the OLS and -10.04 in the IV illustrates that influence of the output value of agricultural product in the original province is huge. This variable represents how much money that agricultural population can make from what they engage in. The result shows that the more people in rural areas can earn from agriculture, the less likely they will leave hometown and move to other places. From the data, it can be seen that most of provinces which export larger number of migrants than the other provinces are those with lower agricultural output value per capita and less developed.

Pull Factors in Urban Areas:

The employment in nonagricultural industries or percentage of nonagricultural industries in destination province is positively connected to the migration to this province and the result is significant in both general and preferred model. From the result, the effect is more significant in the general mode especially in the OLS regression. The coefficient (1.31) means that when the percentage of nonagricultural employment in one province increase 1%, then 1.31% increase of migrants will tend to move to the corresponding province. In the preferred model, the standard error is approximately one half of the coefficient, which satisfies the standard for statistical significance. As the most migrants are moving from rural areas to urban areas and expect to find jobs in cities, they abandon the agricultural work in primary industry and engage in the secondary or tertiary industry in cities. The higher employment in nonagricultural industries of home province denotes that this province is more developed and it can offer more jobs in second and tertiary industries to the migrants. Also, the provinces that have a higher

percentage in nonagricultural industries are often wealthier provinces and thus can pay higher wages for migrants, which is attractive to migrants.

Another aspect estimated in the research is the fixed asset investment per capita in the destination provinces, and the coefficient turns out to be positive and significant in the preferred model. Higher fixed investment can show the administrative level and how much construction projects they can have, which are directly to the jobs available to rural migrants as most of the male rural migrants in China engage in the land or housing construction once they move to cites. That explains why the local fixed investment of home provinces is considered and positively correlated to the number of migration population to the destination.

Contrary to what expected, the result of the government fiscal expenditure per capita in home province seems not the attractive element in migration. The coefficient is negative and significant. Both in the general and preferred model, the coefficients in OLS and IV regressions show strong significance. The reasons can be derived from looking at the data. From the data, it can be known that some provinces with higher government fiscal expenditure are underdeveloped ones with fewer populations like Yunnan, Qinghai, Xining and Xinjiang in the west of China. The reasons that why these provinces have higher fiscal expenditure per capita are owing to two factors. Firstly, poorer provinces are often weak in the infrastructure. Therefore, a large amount of money is spent by government to construct the public goods such as the road and bridge and also for the merit goods like hospitals and public schools. Secondly, the population in those provinces in the west of China is much fewer than other provinces due to the extreme weather and worse natural environment. As these provinces are not attractive for migrants, it is reasonable that the government fiscal expenditure is negatively related to the population of migrants.

In terms of unemployment rate in home province, the situation becomes complicated. In poncet's model for intra and inter provincial migration and the general model, the unemployment is negative and significant as the all the coefficients except for the case in the IV regression in the general model. Though positive in the IV of general model, the coefficient is about equal to standard error, showing that this positive result is insignificant and not contrary to the results from other regression models. It proves the Harris-Todaro's model and geographical economics model that the migration decision is based on the probability of finding a job in the destination. The high unemployment rate denotes less probability of finding jobs and will cause less migration towards the destination. However, in the preferred model, the result is still negative but not significant. Similar to the case in general model, the coefficient is positive in IV regression of preferred model but much smaller than the standard error, and thus it is also insignificant and can be ignored. By checking the data, it can be known that some wealthy and important cities or provinces such as Beijing (5.64%), Tianjin (9.53%) and Shanghai (9.57%) have very high unemployment rate. These cities are importing a large amounts of migrants as the average wages of these places are much higher and are especially attractive as the center of China's economic zones. Therefore, what role the unemployment rate of some special places plays in the migration decision can't be known. It might be cases that the migrants' decision is not that affected by the unemployment if they choose to migrate to Beijing or Shanghai. Furthermore, more job opportunities a city or province can offer and more developed a place is, it will have more people quitting from their jobs and searching for new jobs as they are faced with more choices. As the unemployment rate is calculated as dividing by the number of unemployed people but still in labor market by the labor force, the high unemployment rate can be explained by the higher percentage of people searching for jobs in

those highly developed cities and provinces. From the perspective of economic environment and higher wages, these places are still able to attract a large amount of migrants from other provinces all around the nation. Moreover, there is another phenomenon in the data that three provinces in the northeast of China: Liaoning(9.47%), Jilin(6.98%) and Heilongjiang(8.1%) all have very high unemployment rate. It is because that during the period of 1995-2000, a great number of workers in state-owned enterprise lay off due to the joint-stock system reform of state-owned enterprises. However, from the data of migrating population, there was still a large amount of migrants moving to these three provinces especially Liaoning as they were once the industrial center of China and other enterprises and industries are still developing and providing working opportunities for labor migrants.

Migration Cost:

In Poncet's model, the migration cost is shown by three variables: distance, dummy variables for inter- or intra- provincial migration and dummy variables if the two provinces share the same border among the inter provincial migration. According to the result in Poncet's model and also the general and preferred model, the effect of migration cost is illustrated by the result of regressions.

Distance enters with the expected sign, which means that the migration flows decrease significantly along with the increase the distance between the home and host provinces. The significance of the distance is strong as the absolute value of the coefficient is very close to one. Then we differentiate the inter- and intra- provincial migration and get the expected positive sign and significance in the Poncet's model (The coefficient is about 10 times of the standard error). It shows that migrants are more likely to migrate within their own provinces. It is

anticipated that the extra cost will be applied to migrants if they move out of provinces, thereby engaging in intra- provincial migration rather than inter- provincial migration.

The coefficient for dummy variables of sharing common borders is positive and quite significant. It denotes that migrants tend to move the provinces that share the same border with the original provinces if they choose to move out their own provinces. As what we expected, the financial and moral costs which might affect migrants' income and satisfaction will be decreased if the destination shares with the same border, thus the migration cost is mitigated and more migration occurs in this case.

Conclusion

In this paper I analyze China's migration by estimating the multi-regional model that based on the logic that migrants decide to migrate in order to obtain higher wage. Based on the results, I find that wage plays a vital role in migrants' decision making for both inter- and intra-provincial migration. The higher the wage level of this region is, the more migrants are attracted to. The wage gap between rural areas and cities within one province or among different provinces greatly contributes to China's urbanization.

Furthermore, in terms of inter-provincial migration, the provinces with superiority in nonagricultural employment, fixed asset investment attract more migrants; on the other hand, provinces with less arable land and gross value of agricultural output per capita tend to export more labors to other provinces. Most of the pull factors of urban areas and push factors of rural areas estimated in my study show its corresponding effect as expected. However, government fiscal expenditure in the host province turns out to be negatively related to the migration population. Also the unemployment appears to have a negative but insignificant effect on

migration, which can be explained by the fact that most of state-owned firms in developed provinces was undergoing the joint-stock system reform during 1995-2000.

Also, I also try Poncet's model for testing the influence of migration cost on migrants' decisions from 1995 to 2000 and obtain similar results. I find empirical evidence for migration cost is increasing significantly with the distance between the home and host provinces. moreover, the cost is also added when migrants move out their original province compared with intra-provincial migration or the destination provinces are not bordered the original provinces if it is an inter-provincial migration.

Summary (Problems and Potential Issues)

In this paper, I investigate how the migration responds to economic benefits especially the wage level in the destination and migration cost by conducting research on the cross-sectional data for one period: 1995-2000. As China's National Census is conducted once every 5 years, the data for migration population is recorded for 5 years, but the data of the rest variables are recorded once a year in China's Year Book. As I am not able to obtain the corresponding data for migration for each year, this research can only be conducted for one period of 5 years and by taking the average of the total value of the rest variables for estimate. Also, there is only one period estimated in the study as in National Census of 2005, the data for migration population from 2000 to 2005 only documented where the migrants are from but excluded the destinations. Therefore, the results of my study are not very accurate and just partly explain the reasons behind the migration. The unemployment rate in the destination can be an example. As 1995-2000 is a special period and the result turns out to be insignificant contrary to what was expected.

Therefore, if the new data for the original and destination province of migration population can be reachable, it is suggested that we conduct the research on a new period to test if the results are consistent. After 2000, a new element can be considered is the Hukou relaxation policy. It cannot only be counted as a controlled variable but also can be used as an instrument for IV regression

Relaxation of Hukou Restrictions in the Provincial cities in China:

The hukou system, which is a household registration system in China, has divided the population into urban and rural residents. Urban residents are privileged by a range of social services in the city, including employment, retirement insurance, healthcare, children's education, welfare housing and so on. Since 1997, a round of hukou reform was made by the central government. From 2001 to 2011, most of the provincial cities (26 of 32) have issued the hukou reforms. A core component of these local hukou reforms was to eliminate the distinction between agricultural and non-agricultural hukou and establish a unified hukou system.The purpose for the reform was to reduce social discrimination against agricultural hukou holders. When the migrants from rural areas can hold the hukou of the local city, they can enjoy the same welfare benefits and public services as the residents such as purchasing houses, having insurance and sending their students to local public schools. Therefore, the cities which relaxed the hukou restriction are beneficial for migrants to reside and thus are more attractive to migrants.

In 2015, China's central government has initiated a new round of hukou reform and this time it is more focused on middle and small cities and some local governments like Guangdong province are planning to spread the policies over the whole province. It reflects that the overpopulation problem in big cities in China is fairly serious. In my research, I will estimate

how the relaxation of hukou restriction has an influence on the size of the migration and illustrate to what extent will the hukou reform solve the overpopulation problem. Only when we estimate how each element affect migration, can we know what measures we should take in the future.

Table 2:

Hukou Reform at the Local Level : 2001-2011

Year	Cities, prefectures, or provinces
2001	Ningbo, Zhejiang
2003	Shijiazhuang, Hebei; Zhengzhou, Henan; Shenyang, Liaoning; Dalian, Liaoning; Wuhu, Anhui; Chongqing; Hebei province; Jiangsu province
2004	Changde, Hunan; Chunzhou, Hunan; Haidian, Beijing; Nanjing, Jiangsu; Foshan,Guangdong; Guangzhou, Guangdong; Guangdong province; Sichuan province; Hubei province; Shandong province
2005	Jinan, Shandong; Guangxi autonomous region; Zhejiang province; Heilongjiang province
2006	Honghe, Yunnan; Xi'an, Shaanxi; Chengdu, Sichuan; Henan province; Inner Mongolia
2007	Jinan, Shandong; Shunyi, Beijing; Taiyuan, Shanxi; Qingdao, Shandong; Chongqing; Liaoning province; Gansu province
2008	Jiaxing, Zhejiang; Ruzhou, Sichuan; Kunming, Yunnan; Yunnan province
2009	Qiqihar, Heilongjiang; Taiyuan, Shanxi; Guangzhou, Guangdong; Anhui province; Hebei province; Shanghai
2010	Chengdu, Sichuan; Chongqing; Guangdong province; Hebei province; Jilin province; Guizhou province
2011	Yinchuan, Ningxia; Kunming, Yunnan; Jiangxi province; Anhui province; Henan province; Liaoning province

Source: media reports and government documents

Links to Policy:

The result of my study doesn't just test whether there is a causal relationship between the wage gap and the labor movement size from the provinces to provinces or how they are positively correlated. It will also show the changes of how the labor migration react to the wage disparity between different regions in the recent years compared with the previous studies. As the result shows the labor migration is very sensitive to the wage level in the destination, then the government can adjust the income or try to balance the economic development in districts if they aim to control the migration and solve the overpopulation problem in some big cities. From the result, the other impetus except for the income for the migration are also disclosed, and it is also helpful for government to establish policies and to further improve the living qualities of migrants and local residents.

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