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On industrial spatiality Transfer of China: Based on quantitative analysis

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ABSTRACT

In recent years, China has the tendency of labor-intensive industries especially the processing trade industry transferring to mid-western areas. The main provinces to undertake the transfer of processing trade industry are Henan, Hubei in middle areas and Sichuan, Chongqing in western areas, and these regions were also traditional labor export areas. This article focusing on the shortage of labor in labor-intensive enterprises in coastal cities and massive transfer of processing trade enterprises to inland, explored the root causes of such phenomena by comparing the statistics of two typical cities: Chongqing and Guangdong. The comparison result shows that Chongqing has more attraction to labors. Nowadays Chongqing is in possession of considerable development and is taking advantages over coastal cities. Long from now on, the inland transfer of surplus labor of countryside will direct to central cities instead of traditional coastal cities.   © 2013 Trade Science Inc. - INDIA

KEYWORDS

Industrial spatiality transfe;
Quantitative analysis;
Chongqing;
Guangdong.

INTRODUCTION

After the reform and opening-up policy, the Eastern Coastal Areas of China got the chance of developing in the first place and had high speed economic development. But in recent years these areas also face the problems of lack of land and electricity and the increasing cost of labor. With the high speed economic development, problems like the supply of land and labor and other manufacture ingredients becomes hard and the cost of industries become higher and the constraint of recourse and environment has become more obvious. What's more, the strain of industrial updating continues increases. When the eastern economic developed areas accelerate traditional industrial technology alteration speed and promote industrial structure and develop high and novel technology industries like Electronic Information Industry, equipment manufactured, cars manufactured and petroleum and chemical industry vastly, they has to migrate processing trade including labor-intensive and resource-intensive industries to exterior area so as to adjust to this situation and achieve sustainable development and save space for a new turn of international industrial migration[1].

The mid-west areas have advantages in labor, land and other manufacture ingredients obviously comparing with eastern coastal areas. Furthermore, these areas also have second mover advantages in basal conditions. Therefore, China has the tendency of labor-intensive industries especially the processing trade in-

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dustry transferring to mid-western areas. The main provinces to undertake the transfer of processing trade industry are Henan, Hubei in middle areas and Sichuan, Chongqing in western areas, and these regions were also traditional labor export areas. When processing trade companies gathered in coastal cities, a mass of labor from mid-western areas migrated into these areas in trans-regional way. The vast parts of these labors were looking for economic incomes individually when they migrated to these areas and returned home regularly. The processing trade companies' transfer must have great influences on traditional labor migration across regions.

The literature on rural-urban migration and growth in China is reasonably rich. There are mainly four types of study. These four types of study are severally focus on migration pattern, factors influencing migration patterns, determinants of migration decision and the influencing of single factor on migration decision. Cai and Wang classify migration pattern into institutional migration and behavioral migration according to migrant's willingness and institutional barrier[2]. Zhang et al. analyses migration patterns from individual migration and household migration. She finds that household migration is more and more prevalent in the process of urbanization and migrant will have a better living state because their work and family are more permanent[3]. Cai divides migration into temporary migration and permanent migration. He analyses different migration patterns and raises some useful suggestion to weed out barriers in migration processes[4]. Yao et al. (2009) analyses factors influencing bird float migration based on investigation data of migrant in Hangzhou. They find that important factors are working skill, medical security, contract of labor, safety protection and income and expenses status[5]. Ma and Meng (2003) established a dicriminant function to analyses permanent migration and finds that rural-urban income gap is the most important factor, education level is less important[6]. Duan establishes migration matrix to simulate the choose of immigration places and applies logistic model to analyses the degree of each factor. He finds that distance between two provinces is the barrier of migration. The farther between two provinces, the less probability of migration will happen[7]. Zhu uses logistic model to analyses migration from one province to another. The result

shows that population size has a coefficient effect on both immigration and emigration places and the influence of geographic distances is the same as Duan's finding[8]. Zhang and Song investigate factors behind the migration boom with time-series and cross-section data. They find that both inter and intra province rural-to-urban migrants are encouraged by the income gap between rural home and urban destinations. While geographic distances discourage inter-province migration, the urban population size in a province has positive effects on intra-province migration of that province[9]. Chen and Coulson established a city fixed-effect model and use logistic model to analyses each factor. Regression result shows that cities with high ratios of the manufacturing and service sectors grow most rapidly in the amount of migration[10].

INTER-REGIONAL LABOR MIGRATION——BASED ON FIELD POTENTIAL MODEL

There are benefits or reduce mechanisms in nature, such as the phototaxis of plants, the animals' orientation and mobility response to one-way environmental stimulation, the point-to mechanism among biological communities and so on. The Taxis Conduct, genetic traits, has been preserved by natural selection because it has adaptive significance. Human have this characteristic as to, but compared to other living things the objects of the human stress response are more complex. Migrant workers' leaving from rural areas to cities in search of employment opportunities is the concrete embodiment of the benefits or reduce mechanism, which is a social "biological process". This biological process is a "space embedding" process in the background that migrant workers leave out of rural society into the urban society actively or passively.

The space transition of migrant workers is as if the physical mass transfer or energy exchange, which is driven by the unbalanced nature of environmental systems, the field-. The potential is the measure of field. Potential energy could lead to mass transference, energy exchange and information transference. The migrant workers' spatial displacement of material form is the field campaign in the context of differences in environmental conditions and socio-economic conditions. Environmental conditions can be characterized by the

comforts (such as the facilities of life, education, health, etc, while the income level directly reflects the economic impact of population movement.

For farmers, the equal utility curve of spatial preference of environmental comfort level and income is showed in figure1.
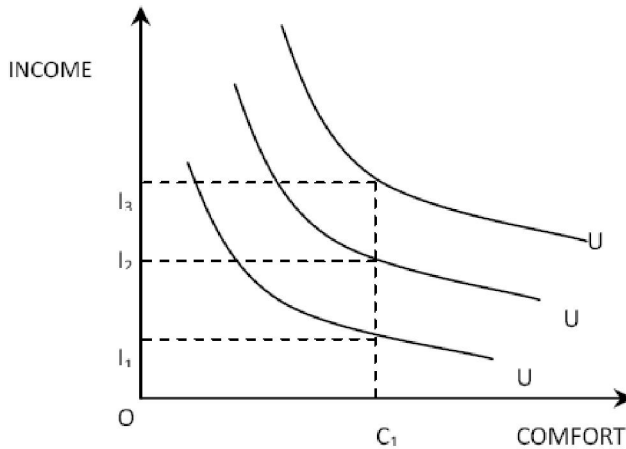

Figure 1 : The equal utility curve of spatial preference

In figure 1, U_1, U_2, U_3 stand for farmers' equal utility curve in rural area, inland city and coastal city. Every point in the curve has the same utility for individual which means higher income causes less environmental comfort level and higher environmental comfort level causes less income. There for, in order to keep the environmental comfort level and make more money, farmers will get into a new environment, for example, in the environmental comfort level C_1, farmers will get into inland city or coastal city for the income level I_2 or I_3. The difference between U1,U2,U3 forms migrant workers' spatial transition.

Refer to JQ Stewart's gravitation model, set the field potential model of migrant workers' spatial transition:

$$F=(P\eta_{ij})^{\alpha}/R^{\beta} \tag{1}$$

Where F means field potential of migrant workers' spatial transition, that is the main driving force of impacting migrant workers' migration decisions; P means the difference of aggregate economy between two places; ηi, j means differences of income levels and environmental comfort levels per capita between two places. (The comfort levels are characterized by available housing, medical care and other resources conditions, while the income criteria direct reflects the socio-economic conditions of population movement.); R means the distance

between the two places; α means the regional difference index (in different economic and social background, the driving function of varied incomes and environment to population spatial transition is different); β means the friction coefficient, that is the difficulty of spatial transition caused by factors such as traffic conditions; *α* and *β* are determined by varied situations in regions.

Now let's study η_{ij}. We assume that a farmer has fixed labor resources *L* in a certain period. These resources can be distributed between agriculture and non-agricultural activities. The farmer is a rational economic-man and he can maximize his total labor income by optimize the labor allocation. For simplicity, we assume that the non-agricultural activities can only carry out in the non-farm work which is paid in urban. The wages (*w*) which is affected by unemployment rate is exclusive of related costs. The production function of agricultural activities can be written as:

$$r=f(l,c,n) \tag{2}$$

In (2), *l,c* and *n* stand for Labor inputs (labor time), capital investment (seeds, fertilizer, pesticide, farmland basic construction, agricultural machinery, etc and investment of land. We assume the technical features positive all invested marginal product numbers, while the cross derivative are non-negative numbers. Then the objective function of each unit can be representing by

$$Maxpf(l,c,n)-rc-sn+w(L-l)(l,c,n>0) \tag{3}$$

In (3), *p* stands for agricultural product price vector ÿr stand for the capital of the lease price (capital discount), s stand for rental price, *L-l* stand for the non-agricultural labor time after spatial transition, *w* stands for the income of unit non-farm labor time.

According to (3), it can be deduced as following:

Hypothesis 1: higher non-agricultural Labor wage rate can attract more farmers to migrant;

Hypothesis 2: whether the rural migrant workers have city-settled-intention or not won't affect their decision of spatial transition (city-settled-intention actually indirectly reflect their inclination for the differentiation of overall environmental comfort level between urban and the countryside).

This paper verifies the above assumptions based on the questionnaire survey data analysis. Although all the interviewees are migrant workers, the questionnaire

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is designed to find out how many rural farmers who live in the same village don't work out, then we will get the relative statistic data. The total number of samples is 3910. TABLE 1 summarizes the difference of characteristics between the rural migrant workers and farmers in rural areas

TABLE 1 : The characteristics difference between rural migrant workers and farmers in rural areas

	Rural migrant workers	Farmers in rural areas
Average age (years)	28.1	39.2
Education years	10.3	8.5
Male percentage （%）	61.8	41.7
Married people proportion （%）	52.1	73.2
Cultivated land area per capita(mu)	1.1	1.6
Net income per capita (yuan per year)	7315	4221
Personal liquidity assets (deposit + cash) (yuan)	4312	2605
Proportion of farmers who have migrant intention （%）	11.3	12.1

Data sources: Xi'an, Dongguan and Chongqing questionnaire

Using Logistic model to estimate the data above, we get the result in TABLE 2. TABLE 2 also shows the explanatory variables' marginal effect on the probability of spatial transition. For those continuous explanation variables, we use sample mean to estimate marginal effect. For non-continuous variable, we estimate it by comparing with a reference group.

In TABLE 2, the results verified two hypotheses above, that is: among all decision factors of the migrant workers, higher wages which non-agricultural labor can get and the quantity of cultivated land are more important, while the intention of migrant to urban (that is, rural farmers are willing to pursue better life which due to the changes of environment) is not important enough to have impact on migrant workers' decisions. Assume other variables remains the same, if income increases 1000 yuan, the probability of rural farmers' migrant to urban will increase 9.14%. And if the quantity of cultivated land reduced by 1 mu, the probability of rural farmers' migrant to urban will increased 1.79%. However, the quantity of cultivated land in a certain period is fixed. Therefore, the pursuit of relatively high wages is the main driving force of rural farmers' migrant. On the other hand, advantages of better environment in urban is not the driving force of rural farmers' migrant.

According to the quantitative analysis above, we can find that the differences of middle-level income $\eta_{i\ddot{y}j}$ is the dominant factors which cause the spatial transition, while the difference of environmental comfort level of is not obvious. Therefore, (1)can be represented byÿ

$$F=(PI_{i\ddot{y}j})^{\alpha}/R^{\beta} \qquad (2)$$

In (2), $I_{i\ddot{y}j}$ is the difference of comprehensive income level between i and j.

Comprehensive income level is a function which income minus relative cost of living. In migrant workers'

TABLE 2 : The result of Logistic model

Explanatory variable	Estimated coefficient	Standard deviation	$\partial(prob)/\partial x(\%)$	Variables defined	Sample's variable mean
intercept	-1.00**	0.46	n.a.	intercept	n.a.
age	-0.05*	0.01	-0.549	age	33.65
Education years	-0.07*	0.03	-0.82	Education years	9.40
Quantity of cultivated land	-0.25*	0.02	-1.79	Quantity of cultivated land per capita	1.35
Income per capita （1000yuan）	0.75*	0.05	9.14	Income per capita per year	5.77

(dependent variable: rural migrant workers =1,farmers in rural areas =0)

personal liquid assets （1000yuan）	0.69*	0.03	6.87	Deposit and cash	3.46
Intention of migrant to urban	-0.01*	0.00	-0.16	Virtual variable of migrant intention. reference group = no intention of migrant to urban	0.5
male	0.91*	0.16	10.23	virtual variable of gender, reference group =female	0.52
married	-1.25*	0.28	-9.78	virtual variable of marital status, reference group =unmarried	0.63

Note: 1. Sample size = 3910, after adjustmentR²=0.23; 2.* and ** respectively stand for the significance of estimator which between 0.05 and 0.01

decision-making process in migration, for the same individual, changes in the external macroeconomic conditions are major influencing factors to the labor migration policy, while the microscopic conditions relative to transaction keep unchanged, such as health status, age, educational level, professional experience and family factors including the number of family labor, the amount of land owned by per capita, the number of minor children, and so on. Based on the gravitation model, this paper will extract several types of representative factors to do the time series analysis.

DATA ANALYSIS-THE FACTORS' COMPARISON BETWEEN CHONGQING AND GUANGDONG

Chongqing is the core developing city of mid-western areas and it's an important support place for processing trade industry' transfer. Simultaneously, Guangdong province that acts as the delegate of coastal areas is the source of China processing trade firms. According to a survey, 63% of export labor of Chongqing is migrated working in Guangdong province (Chongqing statistics bureau, 2010). After borrowing the theory of circumstance mode and extracting the representative circumstance factors, we make comparison of Chongqing and Guangdong province to explain the lack of labor in coastal areas and the reason of processing trade industry' s transfer.

The choices of factor based on model

Based on the circumstance explanation the circumstance factors this passage involved are on the foundation of (1) equation and they are classified into three kinds.

the first kind of factor reflects the difference of aggregate economy and it includes the difference in annulus annual growth of secondary and tertiary industry, the difference in annulus annual growth of foreign capital; the second can reflect the difference in the level of income in Chongqing and Guangdong,this article expresses this with the difference in surplus of disposable income of metropolitan; the last can reflect the difference in the level of city comfort, this article measures it with beds possess by every million person(numbers/million person) and Per Capita Floor Space of Resi-

dential Buildings (sq.m/person).

Data choice

This paper utilize the data from Chongqing and Guangdong province's statistical yearbooks which can reflect these three factors as research basis to make comparison. In statistical yearbooks the indexes that can represent every circumstance factor are as followings.

Aggregate economy is represented by the GDP growth rate of in annulus annual growth of secondary and tertiary industry, the actual utilization of foreign capital; income gap is represented by the surplus of disposable income of metropolitan; environment comfortable level discrepancy is revealed through the beds possess by every million person (numbers/million person) and Per Capita Floor Space of Residential Buildings (sq.m/person).

Wei measured and calculated employment-output elasticity using the number of workers in three major industries and the increasing number from 1997 to 2002. And the result revealed that the primary, secondary and tertiary industry employment-output elasticity were 0.088, 0.237, 0.370 respectively. Among them the primary industry's employment-output elasticity was the minimum and the tertiary industry's was the maximum. It indicated that with the growing of domestic economy the tertiary industry pull employment ability was the strongest, the secondary was smaller while the primary was the weakest. Therefore, this paper uses the secondary and tertiary industry increasing ratio discrepancy to reflect their total amount of employment and to the migrating individuals it means the possibility to be employed; and the exploiting of foreign capital situation can reveal two cities' attraction and potential to foreign capital. Citizen's surplus of disposable income of metropolitan refers to daily life expenditure except the rest in a certain degree and it can reveal workers' income in these two cities to some extent. Environmental comfortable level is revealed through the beds possess by every million person(numbers/million person) and Per Capita Floor Space of Residential Buildings (sq.m/person)of the town house and living conditions,this index can tell the extent of living comfort of the labors in Chongqing and Guangdong province.

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The comparison of aggregate econom

In Figure 2 we can see that from 2000 to 2002, the difference in annulus annual growth of secondary industry is approach to zero. It means there has no obvious difference in annual growth of secondary, and the contribution of employment made by secondary industry is almost the same in Chongqing and Guangdong. From 2002 to 2006, the curve has slight fluctuation. After 2006, the difference in annulus annual growth is becoming large and gets the peak of 13.49% in 2008. It means after 2006, secondary industry in Chongqing develops faster than that in Guangdong and contributes more to employment. The curve of the difference in annulus annual growth of tertiary industry is rising all the time, from -12.63% in 2000 to 3.93% in 2009. It means tertiary industry in Chongqing develops faster than that in Guangdong and contributes more to employment.
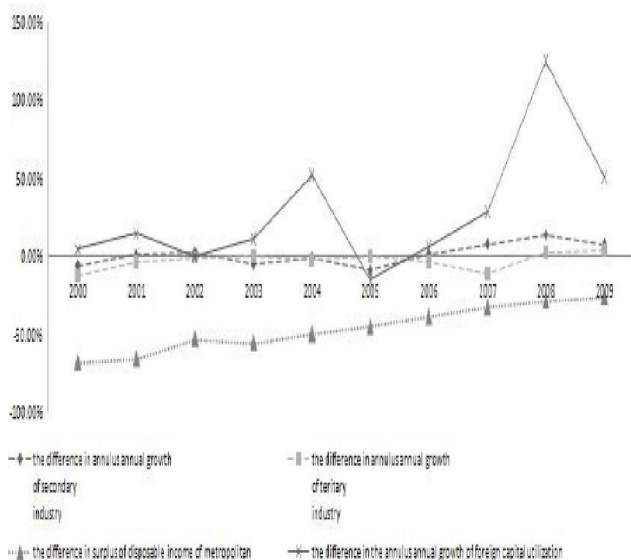
Note: the statistic is coming from the Statistical yearbook.

Figure 2 : Changing trend diagram from 2000 to 2009

The curve of the difference in the annulus annual growth of foreign capital utilization is rising from 2000 to 2004 and the difference is greater than zero. It means the growing rate of foreign capital utilization in Chongqing is greater than Guangdong. From 2005 to 2009, the curve substantially increases and gets the peak of 125.74%. The curve means that generally speaking, the growth of foreign capital utilization in Chongqing is far outweigh than Guangdong and it indirectly means that Chongqing has more potential in foreign investment and development space.

surplus of disposable income of metropolitan

Surplus of disposable income of metropolitan means disposable income of metropolitan minus daily living expenses. It can represent labor's actual income in Chongqing and Guangdong. In Figure 1, the curve is rising from -67.84% in 2000 to -25.90% in 2009. It means the gap of actual income between Chongqing and Guangdong is narrowing.

The comparison of environment comfort

From chart2 we can see that the curves of beds possess by every million person(numbers/million person) reflecting the medical treatment level in cities and towns which representing Chongqing and Guangdong hold stability from 2000 to 2009, with the number 56.6 of Chongqing and 22.89 of Guangdong. In the mean time, as to the Per Capita Floor Space of Residential Building which reflecting housing conditions, Guangdong keeps a trend of slight fluctuations around 33 square meters while Chongqing rises steadily and started surpassing Guangdong in 2008, that may be a consequence of Chongqing's intensifying efforts to creating low-income housing. From 2010, Chongqing government started promoting public rental housing, aiming to build a housing security system orientated by public rental housing. On the 12th of February, 2011, Chongqing Detailed Rules for Implementation of public rental housing was put into effect and civic public rental housing applications were accepted. By March, the first set of those applications were received. The public rental housing mode in Chongqing is comparatively successful and mature in China so far and became the model of other provinces and cities. As a result, Chongqing is highly valued at housing conditions and may outpace Guangdong dramatic in 2011.

Therefore, we can conclude from the analyses of Figure 2 that Chongqing is better than Guangdong in habitability and environment comfort to some extent.

CONCLUSION

This article focusing on the shortage of labor in labor-intensive enterprises in coastal cities and massive transfer of processing trade enterprises to inland, ex-

plored the root causes of such phenomena by comparing the statistics of two typical cities: Chongqing and Guangdong.

After data analyses in the third part of this article, we can know that, from 2000 to 2009, the economic aggregate of Chongqing and development pace of foreign capital investment potential both exceeded Guangdong, which reduced the location disparity of inland and coastal areas, that was accelerated by the salary rise of inland cities and the ever-growing difference of living cost between inland and coastal areas. Meanwhile, the condition quality of Chongqing is higher than Guangdong which can be told from the medical resources and housing conditions. Chongqing is abundant in labor resource, before 2000, large amount of labor were exported to coastal cities. However, nowadays Chongqing is in possession of considerable development and is taking advantages over coastal cities. Long from now on, the inland transfer of surplus labor of countryside will direct to central cities instead of traditional coastal cities. The coastal areas must achieve industry upgrade simultaneously under such condition.

The urbanization of Chongqing will speed up with the economic growth and increase of foreign capital investment scale. During that process, massive labors head to searching jobs in cities so that how to solve those housing problems and adjusting the needs to governmental security housing plan will be the next key issue of our research.

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