# Can Regional Plan Promote the Integration of Labor Market?
# ——Evidence from Chengdu-Chongqing Economic Circle

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**Abstract:** Integrated labour market is the basic condition of the efficient urban agglomeration. In the last 10 years, the state has issued the regional plan of Chengdu-Chongqing urban agglomeration for three times. Does regional planning promote the integration of labour market in Chengdu-Chongqing Economic Zone? This paper takes the 2011 Chengdu-Chongqing Economic Zone Regional Plan as a quasi-natural experiment, uses the synthetic control method to test whether the regional plan has an impact on the integration of the labour market in Chengdu-Chongqing Economic Zone and takes the empirical test on the factors that affect the labour market integration. The result shows that the regional plan does promote the integration of labour market. The Government Intervention, Economic Gap, Agricultural Employment, and Urbanization has a negative impact on the labour market integration. The Financial Development, Labour Force and Trade Dependence has a positive impact on the labour market integration. The conclusion of this paper plays a guiding role in promoting the economic integration of Chengdu-Chongqing Economic Circle and optimizing the efficiency of resource allocation.

**Keywords:** Labour market integration, synthetic control method, Chengdu-Chongqing Economic Circle, Urban agglomeration

## 1    Introduction

Since Chongqing broke away from Sichuan province and became a municipality directly under the Central Government, Chongqing's economy has achieved unprecedented growth, but the economic growth rate of New Sichuan is relatively small [3]. The economic gap between Chengdu-Chongqing region is extremely unbalanced. Except Chengdu and Chongqing, the economic level of other regions is low and there are a large number of poverty-stricken counties. And the administrative barriers between local governments in Chengdu-Chongqing area are serious, which leads to the segmentation of factor market [5]. Labor market integration mainly refers to the free transfer of labor under the market mechanism and the formed a unified labor market between regions [2], so as to realize the reasonable and optimal allocation of labor

resources within the region. Therefore, how to guide the labor between regions and promote the integration of labor market is an important issue to be solved in the process of high-quality economic development in Chengdu-Chongqing region.

One of the effective ways to solve the above problems is to establish cross-administrative economic zones or economic circle [4]. In 2011, the State issued the Regional Plan of Chengdu-Chongqing Economic Zone. Ten years later, does the regional plan of Chengdu-Chongqing Economic Zone has impacted the integration of labor market? Does it achieve the desired effect? If not, what improvements should be made afterwards? To solve these questions, it is essential to empirically evaluate the effect of the Regional Plan on labor market integration and test the influence factor. Therefore, this paper has a great significance to the high-quality development of the Chengdu-Chongqing Economic Circle.

## 2    Methods

Based on the previous research, this paper takes the average wage of workers in Sichuan and Chongqing cities and the relative price method to get the labor market integration index [8]. The main calculation steps are as follows.

①The logarithmic difference method is used to process the sequential price (Comparison of current price with previous price) of the average labor wage in city I and all other cities.

$$\left|\Delta Q_{ijt}\right| = \left|ln(P_{it}/P_{it-1}) - ln(P_{jt}/P_{jt-1})\right| \tag{1}$$

②In order to eliminate the difference of labor wage fluctuation caused by other factors such as labor market environment difference, the mean value of $\left|\Delta Q_{ijt}\right|$ is taken to obtain labor wage fluctuation including only market segmentation factor.

$$q_{ijt} = \left|\Delta Q_{ijt}\right| - \left|\overline{\Delta Q_{ijt}}\right| \tag{2}$$

③Calculate the variance ($VAR(\,q_{ijt})$) of labor wage changes ($q_{ijt}$) including only market segmentation factors. $VAR_{it}$ is taken as the index to measure the degree of labor market segmentation in each region.

④Get the index of labor market integration for each city.

$$\text{INT}_{it} = \sqrt{1/VAR_{it}} \tag{3}$$

## 3    Baseline analysis

The current methods of policy evaluation mainly include Differential Difference Method (DID) and Synthetic Control Method (SCM). Compared with the DID, the SCM can effectively avoid

endogeneity problems caused by the difference of predictive variables between the control group and the treatment group [7]. In consideration of the many advantages of SCM, SCM is chosen as the main test method in this paper.

SCM test is more suitable for evaluating the effect of a single period policy of a single experimental unit. Since this paper involves multiple experimental units, the following preprocessing of experimental units is carried out by referring to previous scholars. The cities[1] in the Chengdu-Chongqing economic zone were selected as the treatment group, and the cities[2] in Sichuan province but outside the economic zone were selected as the control group. This paper adopts the SCM for analysis [1]. The result is shown in Figure 1.
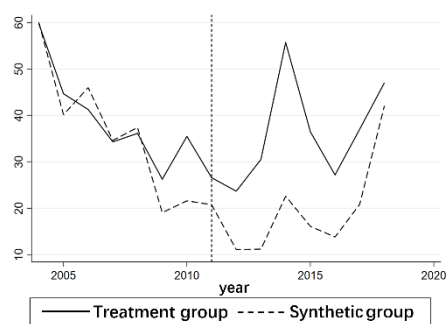


Figure 1: Actual and synthetic labor market integration

As can be seen from Figure 1, the actual and synthetic paths of labor market integration almost overlap before the implementation of the regional plan, which indicates that the units synthesized by SCM can well fit the change paths of labor market integration before to the regional plan. After the regional plan, the level of labor market integration of cities in the economic zone is significantly higher than that of the composite group. In order to specifically observe the differences between the actual and synthetic labor market integration index in each year before and after the regional plan, the differences between the actual and synthetic labor market integration index in each year are calculated through the results in Figure 1 and drawn as Figure 2. As can be seen from Figure 2, after the implementation of regional plan (2011), the gap between actual and synthetic labor market integration has become significantly larger. Although the gap began to narrow after 2014, it can be shown by combining Figure 1 and Figure 2 that the regional plan (2011) can promote the labor market integration of cities within the economic zone within four years.

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[1] Including Chongqing, Chengdu, Deyang, Mianyang, Meishan, Ziyang, Suining, Leshan, Ya 'an, Zigong, Luzhou, Neijiang, Nanchong, Yibin, Dazhou, Guang 'an
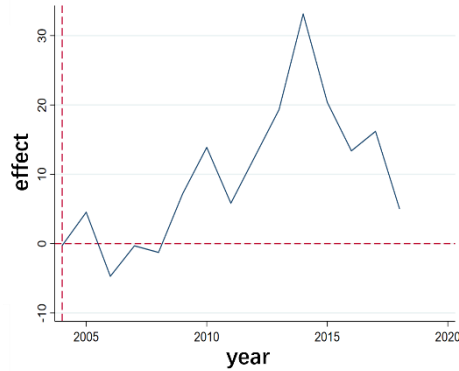[2] Including Panzhihua, Guangyuan, Bazhong, Aba, Ganzi, Liangshan

Figure 2: Difference between actual and synthetic labor market integration

# 4 Result test

## 4.1 Validation test

The Placebo Test and Permutation Test proposed were used to Test the validity of the above results. [6]

The results of the Placebo Test are shown in Figure 3. As we can see form Figure 3 the MSPErate (post-affected/pre-affected MSPE) of the treatment group was 7.71 (dotted bar), much higher than that of the control group (solid bar), which indicate that the validity of the SCM's estimate that regional plan implementation promotes labor market integration. The results of the Permutation Test are shown in Figure 3. As can be seen from Figure 4, the black line represents the treatment effect of the treatment group, and the gray line represents the treatment effect of the control group. It can be obviously observed that the black line is higher than all the gray lines, which means that if a control group of cities is randomly selected to estimation, it is a low probability event to get the same result as the actual treatment group.
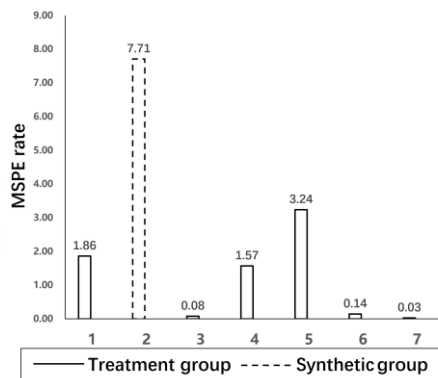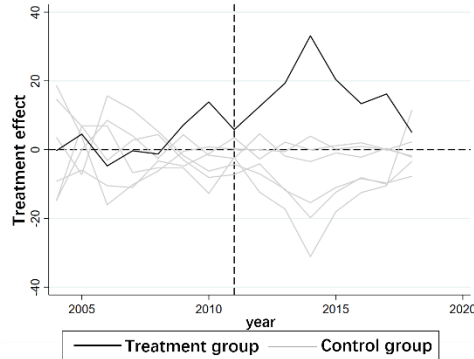


Figure 3: Placebo Test

Figure 4: Permutation Test

## 4.2 Robustness test

The conclusion of the SCM above has verified that regional plan can promote the labor market integration in the economic zone. In order to avoid the errors caused by election of the control group and estimation method, the dual difference propensity score matching method (PSM-DID) was used to do the robustness test. Referring to the previous literatures, Government Intervention (GOV), Financial Development (FIN), Economic Gap (GAP), Labor Force (LFE), Agricultural Employment (AGR), Trade Dependence (TRA) and Urbanization (TOW) was selected as the control variable.

Table 1: Robustness test

| variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| GOV | -0.058*** | -0.064*** | -0.114*** | -0.119*** | -0.109*** | -0.096*** | -0.117*** |
| | (0.010) | (0.011) | (0.017) | (0.017) | (0.018) | (0.019) | (0.228) |
| FIN | | 0.012** | 0.030*** | 0.033*** | 0.023*** | 0.013 | 0.318** |
| | | (0.006) | (0.008) | (0.009) | (0.009) | (0.011) | (0.153) |
| GAP | | | -0.052*** | -0.054*** | -0.074*** | -0.074*** | -0.147 |
| | | | (0.012) | (0.012) | (0.016) | (0.017) | (0.297) |
| LFE | | | | 0.037* | 0.068*** | 0.070*** | 0.059** |
| | | | | (0.019) | (0.020) | (0.026) | (0.027) |
| AGR | | | | | -0.075** | -0.081** | -0.165** |
| | | | | | (0.031) | (0.322) | (0.531) |
| TRA | | | | | | 0.086 | 0.076 |
| | | | | | | (0.063) | (0.069) |
| TOW | | | | | | | -0.199** |
| | | | | | | | (0.089) |
| Differences before the policy | -2.017 | -2.237 | -4.293** | -4.447** | -4.413** | -4.737** | -9.984*** |
| | (2.062) | (1.961) | (1.790) | (1.826) | (1.836) | (1.829) | (1.849) |
| Differences after the policy | 3.526* | 1.281 | 4.807* | 1.023 | 3.724** | 2.665 | 2.758 |
| | (1.780) | (2.143) | (2.795) | (2.606) | (1.849) | (1.991) | (2.193) |
| DID | 5.544* | 3.518 | 9.101*** | 5.470* | 8.137*** | 7.402*** | 12.742*** |
| | (2.858) | (2.904) | (3.319) | (3.182) | (2.606) | (2.704) | (2.869) |
| _cons | 2.242*** | 1.444*** | 3.202*** | 0.975 | 3.607** | 3.9649** | 14.265** |
| | (0.279) | (0.459) | (0.633) | (1.287) | (1.799) | (1.847) | (5.205) |
| N | 176 | 176 | 176 | 176 | 176 | 176 | 176 |
| R² | 0.08 | 0.06 | 0.11 | 0.09 | 0.14 | 0.12 | 0.22 |

It can be seen from Table 1 that the test result of PSM-DID of labor market integration is significantly positive, and its significance gradually increases with the gradual addition of control variables, which reconfirm the conclusion that the regional plan does improve the labor market integration in the economic zone.

The analysis of the control variables are as follows. The coefficient of Government Intervention (GOV) is significantly negative. With the construction of "Chengdu-Chongqing Economic Zone" and "Chengdu-Chongqing Twin cities Economic Circle", the economic cooperation and resource exchange between Chengdu-Chongqing areas have been strengthened, but the hindrance effect of the intervention of the two cities' governments on the labor market integration in Chengdu-Chongqing areas has not been completely eliminated.

The coefficient of financial Development (FIN) is significantly positive, which may be due to the improvement of financial market, which promotes the flow of social capital, thus promoting the flow of labor force, and improving labor market integration.

The coefficient of Economic Gap (GAP) is negative, but the impact of economic gap on the labor market is not significant. This result shows that under the background of large economic gap between different regions in Chengdu-Chongqing economic circle, coordinated development is one of the effective ways to improve labor market integration and labor allocation efficiency.

The coefficient of Labor Force (LEF) is significantly positive, which may be due to the fact that the abundant local labor can meet the needs of the local economy, at the same time, leads to a great employment pressure. so the government tends to persuade the local labor to work elsewhere, which promotes the integration of labor market.

The coefficient of Agricultural Employment (AGR) is significantly negative. For rural labor, if the sum of their transfer payments and farm income is less than their wage income, they have no incentive to migrate to cities. The higher the ratio of agricultural employment is, the more workers whose wages are lower than their expected wages will turn to agriculture, which further widens the gap between urban and rural wages and deepens the degree of labor market segmentation.

The coefficient of Trade Dependence (TRA) is significantly positive. but the impact of the Trade Dependence on the labor market is not significant. The main reasons are as follows: although the expansion of import and export scale will increase enterprises' demand for labor force, the idle labor force is generally low-skilled labor force, which is not highly matched with the posts of foreign enterprises, leading to the limited impact of import and export on labor market integration.

The coefficient of Urbanization (TOW) is significantly negative. Through literature review, it is found that Chengdu-Chongqing region adopts the urbanization path of population transfer driven by industrial spatial agglomeration for decades. Table 2 and Table 3 show the types of cities in Chengdu-Chongqing region in 2004 and 2018. It can be seen that after 14years of urbanization, although the urban population size of 22 cities has expanded, the gap between Chongqing and Chengdu and the other 20 cities has significantly widened. After 14 years of population transfer urbanization, the irrationality of city hierarchy system in Chengdu-

Chongqing area has been intensified. Such urban agglomeration structure will make the industry and labor force gathering in the megacities, leading to the insufficient carrying capacity of megacities, intensified urban-rural dual structure of small and medium-sized cities, and labor force segmentation among cities.

Table 2: Types of cities in Chengdu-Chongqing area in 2004

| Types of cities | Population size | City and Population (0.01 million) | Number of cities |
|---|---|---|---|
| Megacity | More than 1 million | Chongqing (7.86), Chengdu (4.54), Nanchang (1.51), Mianyang (1.20), Dazhou (1.06) | 5 |
| Large city | 0.5-1 million. | Zigong (0.91), Yibin (0.89), Leshan (0.86), Deyang (0.80), Meishan (0.80), Neijiang (0.79), Luzhou (0.79), Suining (0.77), Ziyang (0.63), Guang'an (0.63), Guangyuan(0.60),Liangshan(0.59),Bazhong(0.58),Panzhihua(0.58) | 14 |
| Medium-sized city | 0.2-0.5 million | Ya'an (0.31) | 1 |
| Small city | Less than 0.2 million | Aba (0.17), Ganzi (0.15) | 2 |

Data source: According to the standard of "Urban Planning Law" in 1989, collating the data from the statistical yearbook of cities in Chengdu-Chongqing region in 2004 and the statistical yearbook of Sichuan Province in 2004.

Table 3: Types of cities in Chengdu-Chongqing area in 2018

| Types of cities | Population size | City and Population (0.01 million) | Number of cities |
|---|---|---|---|
| Super Megacity | More than 10 million | Chongqing (16.81), Chengdu (10.16) | 2 |
| Megacity | 5-10 million | - | 0 |
| | Type I Large city: 3-5 million | - | 0 |
| Large city | Type II Large city: 1-3 million | Dazhou (2.36), Nanchong (2.12), Yibin (2.11), Luzhou (2.02), Mianyang (1.93), Leshan (1.36), Deyang (1.34), Meishan (1.34), Zigong (1.21), Liangshan (1.21), Neijiang (1.14), Guang'an (1.12), Suining (1.20), Bazhong (1.06) | 14 |
| Medium-sized city | 0.5-1 million | Guangyuan (0.81), Yaan (0.71), Ziyang (0.65), Panzhihua (0.58) | 4 |
| Small city | Type I Small city: 0.2-0.5 million | Aba (0.25) | 1 |
| | Type II Small city: Less than 0.2 million | Ganzi (0.19) | 1 |

Data source: According to the standard of " the Notice of The State Council on Adjusting the Classification Standard of City Scale" in 2014, collating the data from the statistical yearbook of Sichuan Province in 2018.

The results of PSM-DID basically verify the above description of control variables, and the result of the difference-in-difference (DID) is the same as the above SCM's result, which verify the robustness of the above research results.

## 5    Conclusion

Based on the theory that economic zone influences labor market integration, this paper takes the Regional Plan of Chengdu-Chongqing Economic Zone in 2011 as the standard natural experiment, selects 16 cities in the economic zone as the treatment group, and 6 cities in Sichuan outside the economic zone as the control group. The synthetic control method (SCM) is selected as the model to evaluate whether regional plan promotes the integration of labor market in Chengdu-Chongqing Economic Zone. The two main conclusions are as follows.

(1) The integration of labor market in Chengdu-Chongqing region declined from 2004 to 2012, but the regional plan of Chengdu-Chongqing Economic Zone in 2011 significantly improved the integration of labor market in the economic zone. The validity of the results was verified by placebo method and permutation test, and the robustness was verified by PSM-DID.

(2) From 2004 to 2018, the irrationality of the city hierarchy system in Chengdu-Chongqing urban agglomeration was significantly aggravated, which has led to the insufficient carrying capacity of megacities, intensified urban-rural dual structure of small and medium-sized cities, and labor force segmentation among cities.

Under the background that the Chengdu-Chongqing economic circle is becoming an important national development strategy, the conclusion of this paper has reference value on how to optimize the efficiency of regional labor allocation and promote the high-quality development of Chengdu-Chongqing economic circle. There are two main enlightenments.

First, the cooperation among cities in the economic circle should be promoted, the institutional barriers and information barriers among cities should be broke down. The government should expand the sharing markets, and give more consideration to preferential policies such as trans-regional transportation fees, transportation fees and loan interest rates among the cities. The cost for the labor and other factors to move should be reduce.

Second, the population transfer urbanization in Chengdu-Chongqing economic circle should be transformed into structural urbanization. For some highly urbanized cities, the transfer of labor to Chengdu and Chongqing should be slowed. The surplus rural labor force in these cities should be guided to move to medium-sized cities and small towns or realize local urbanization. In this way, the irrationality of urban hierarchy can be alleviated, the development gap between cities can be shortened, and a higher degree of labor market integration can be realized.

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