HCEO-IESR Summer School, Jinan University

# Dynamics of Spatial Wage Inequality

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# Outline

# I. Background and Motivation

## Large Wage Inequality Across Regions

- From the perspective of **regional labor market**, there exits **large wage inequality across regions** in China's labor market.
- Measure the degree: **dynamic changes of wage differentials among regions**.
- **Two types of existing studies**:
  - **Neoclassical economic theory**: Free movement of labors will eventually lead to **wage convergence** among regions *(Topel, 1986; Barro et al., 1991; Blanchard et al.,1992)*.
  - **New economic geography**: **Agglomeration effect** widens wage differentials among regions.*(Krugman, 1991; Stafford, 2003)*.

## Issue

- Lack of geographically precise discussion focusing on **cities**.
- Assume different regions have the **same economic status**.

# I. Background and Motivation

## China's Administrative Hierarchy System

- The **unique** economic resource allocation system in China – a centralized state since ancient times.
- **"Administrative center bias"** – Important production materials are often **distributed in a cascading order** from central to local and from higher to lower level cities. *(Wei Houkai,2014; Wei et al. 2013; Moomaw and Shatter, 1996)*
- We introduce **city administrative level** as an important **factor** into our analytical framework on wage differentials among cities.

## *Hukou* Discrimination

- ***Hukou* System**: In the 1950s, agricultural vs non-agricultural *hukou*.
- In the 1980s-1990s, **movement restrictions relaxed**, a large number of rural migrants flooded into urban labor market.
- ***Hukou* Discrimination**: **rural migrants** and **urban residents** are unequally treated *(Meng and Zhang, 2001; Cai He and Wang Jin, 2007)*:
  - wage or income
  - employment opportunities
  - public services
  - social welfare
  - ...

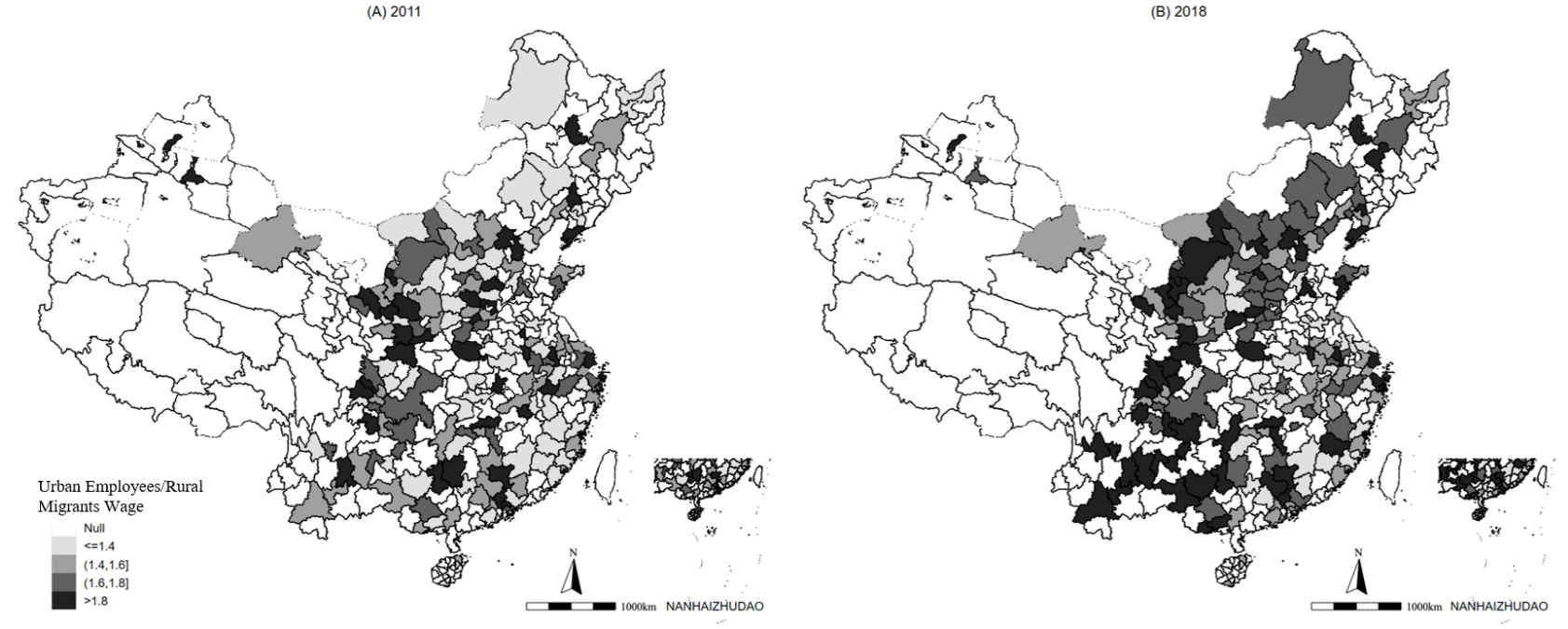



**Fig. 1. The Geographical Distribution of the Urban Employees/Rural Migrants Wage (176 Cities).**

- **Consider the heterogeneity of different *hukou* rather than just see as a whole or a single group for labors.**

## *Hukou* Reform

- Chinese government **accelerated** *Hukou* Reform after 2010.
- At **the end of 2013**, the document proposed:

> *"fully relax Hukou restrictions of towns and small cities, orderly relax Hukou restrictions of medium-sized cities, reasonably determine the requirements for Hukou in large cities, and strictly control the population size of megacities."*

**Table 1**

Implementation of Hukou Reform in Jiangsu Province.

| District | Public Document | Date | Contents |
|---|---|---|---|
| Jiangsu Province | *Opinions of the Jiangsu Provincial Government on Further Promoting the Hukou Reform* | 2015.02.09 | (i)Requirements for hukou in small cities: Legally stable residence.<br>(ii)Requirements for hukou in medium-sized cities: Legally stable residence and employment, pay social insurance for a certain number of years.<br>(iii)Requirements for hukou in big cities: Legally stable residence and employment for a certain number of years, pay social insurance for a certain number of years.<br>(iv)Key personnel settle down: Possess the characteristic of long residence, strong employability, adapting to industrial transformation and market competition, including college graduates, skilled workers, overseas students. |
| Nanjing | *Measures for the Implementation of Point-based Hukou in Nanjing, Management Measures for Access to the Hukou in Nanjing* | 2016.12.22 | (i)Point-based hukou conditions: Hold a residence permit, legally stable residence and employment, pay social insurance for 2 years, accumulated points reach 100 points, no serious criminal record.<br>(ii)Hukou conditions without points: Placement of ex-servicemen, personnel who meet the talent introduction policy, those who take refuge in friends and family, local students college graduates back to the original hukou.<br>(iii)Hukou requirements for house purchases were abolished. |
| Wuxi | *Notice of the Municipal Government on Printing and Distributing the Regulations on Hukou Access in Wuxi City* | 2017.07.05 | (i)Hukou conditions for talents: Overseas talents, all kinds of outstanding and urgently needed talents.<br>(ii)Hukou conditions for migrant workers:<br>a)legally stable employment, pay social insurance for 5 years, purchase per capita area(>=18 ㎡).<br>b)Technical/Vocational school or above, legally stable employment, pay social insurance for 3 years, purchase per capita area(>=18 ㎡).<br>c)College degree or above, legally stable employment, pay social insurance for 2 years, purchase per capita area(>=18 ㎡). |
| Xuzhou | *Opinions of the Municipal Government's on Further Promoting the Hukou Reform* | 2017.05.19 | (i)Hukou conditions: Legally stable residence and employment for 3 years, pay social insurance for 3 years.<br>(ii)Key personnel settle down:<br>a)At least 5 years of employment and residence.<br>b)Rural students entering higher schools.<br>c)Join the army.<br>d)Rural migrants with family.<br>e)College graduates, skilled worker, Overseas talents. |

Note: All information was filtered from the website of the Jiangsu provincial government (http://www.jiangsu.gov.cn/). Just several cities are shown in the table due to space limitation.

# I. Background and Motivation

- The policy shows **two facts**:
  - Different intensity of policy implementation for different administrative-level cities *(Zhang Jipeng and Lu Chong, 2019)*.
  - Different preferences for different *hukou* or skill of labor.
- We can **compare** the **difficulty of obtaining local *hukou*** from hard to easy (*hukou* index):
  - rural migrants: high-level cities, low-level cities
  - urban employees: high-level cities, low-level cities
  - high-level cities: rural migrants, urban employees
- Test whether *hukou* reform **promotes** wage convergence.
  - **Easier** of obtaining local *hukou*, **more** likely wage convergence occuring.

# I. Background and Motivation

- **Theory Basis**: Wage convergence and agglomeration theory.
- **Data**: China Migrants Dynamic Survey (CMDS) and urban statistical data in 2011-2018.
- **Research Questions**:
  1. Analyze **the dynamic changes of wage differentials among 176 cities** of higher and lower administrative levels for rural migrants and urban employees.
  2. Test the **mechanism of wage convergence** in combination with *hukou* reform.

# I. Background and Motivation

**Contributions**:

1. Establish an **comprehensive empirical analysis framework** to depict the dynamic changes of wage differentials among cities in China's labor market.
2. Combine with the **unique *hukou* reform** to test the mechanism of wage convergence.
3. Build a **unique city-panel dataset**:
   - Latest
   - Large-scale nationwide survey for migrants
   - publish the administrative codes

**Preview the Results**:

1. **In 2011-2018 for rural migrants:**
   - The wage convergence among low-level cities changes from strong to weak.
   - Taking 2014 as the turning point, the wage convergence among high-level cities turns into divergence.
2. **In 2011-2018 for urban employees:**
   - The degree of wage convergence among low-level and high-level cities is basically unchanged.
3. **Why rural migrants among high-level cities diverges after 2014?**
   - Rural migrants face stronger *hukou* restrictions in high-level cities.

# II. Theoretical Framework

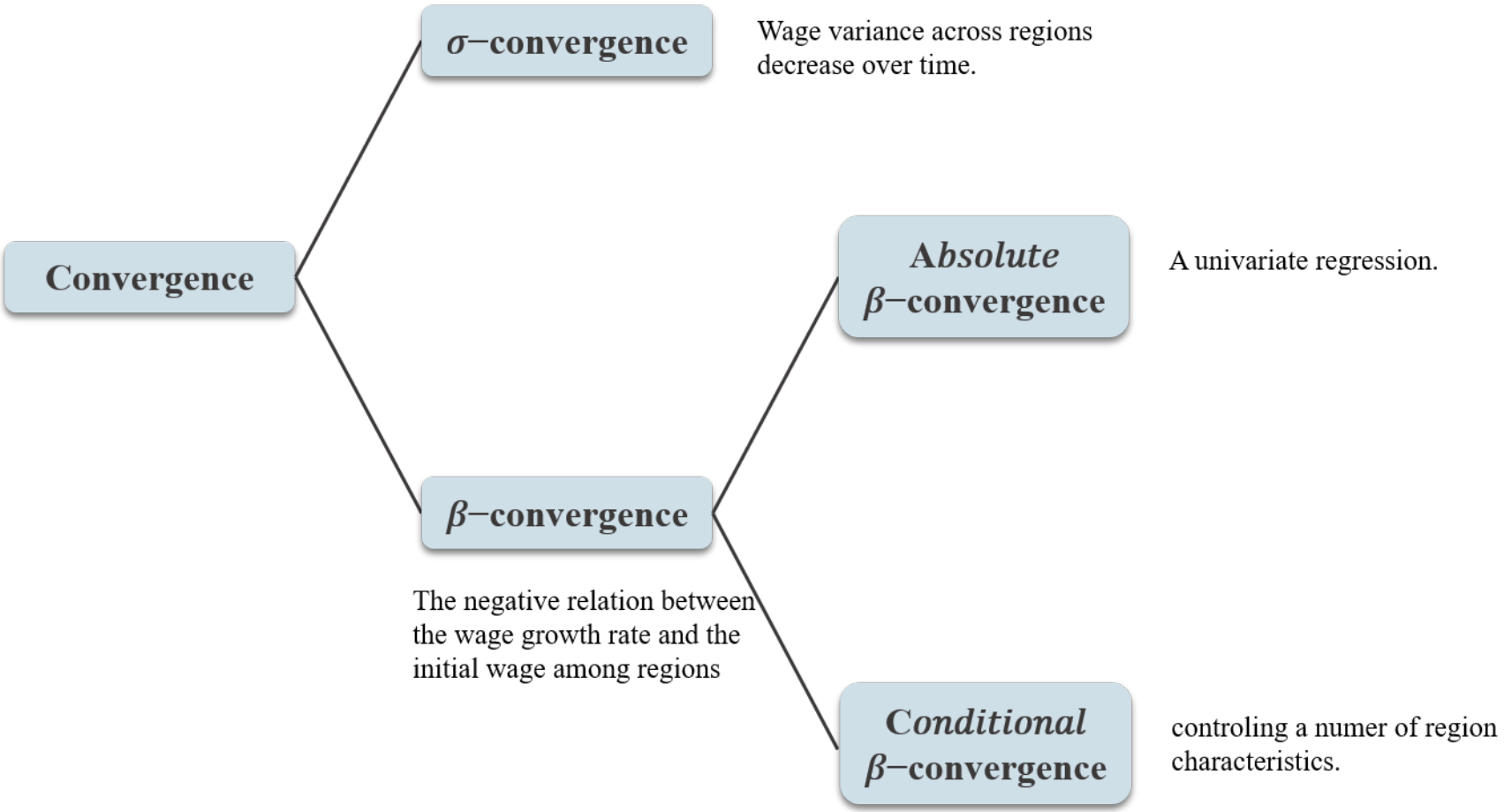



**Fig. 2. Convergence Definition.**

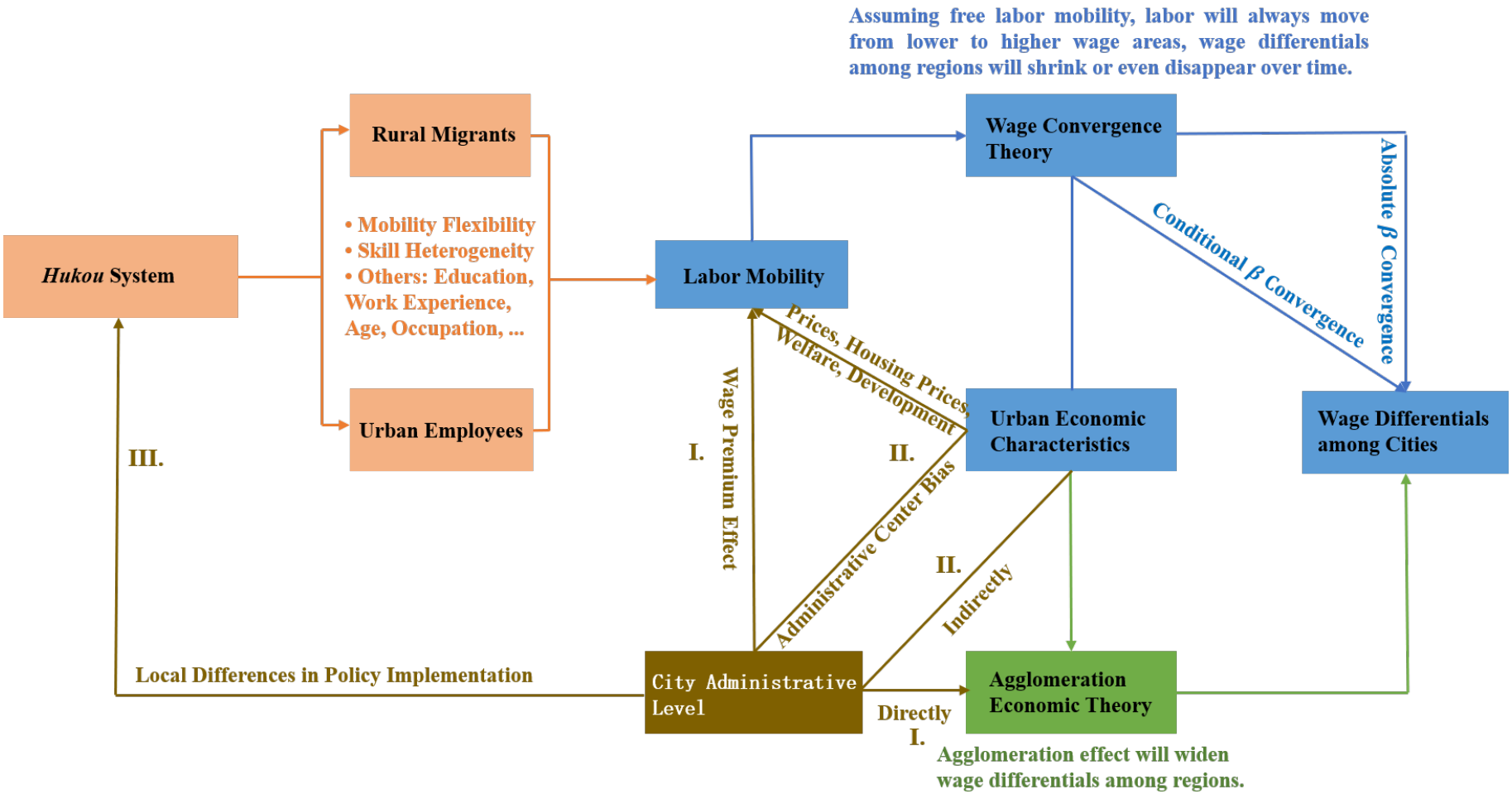



**Fig. 3. Conceptual Framework.**

# III. Data and Description

## China Migrants Dynamic Survey (CMDS), 2011-2018

1. **Screening sample for rural migrants (> 400,000)**: agriculture *hukou*, employment status, wage>0, 16-60 years old, no self-employed.
2. **Urban average monthly wage of rural migrants**: using CPI.

## China Urban Statistical Yearbook and Other Urban Statistical Data

1. **Urban average monthly wage of urban employees**: using CPI.
2. **Urban economic variables**: physical capital, human capital, government expenditure, foreign investment, transportation infrastructure, financial development, industrial structure, employment competition.
3. **Housing price**: from Macroeconomics and real Estate Database, National Information Center.

## China's Labor Market Index Report

1. ***Hukou* index**: measures the degree.

**Table 3**

Administrative Level Division of 176 City Samples.

| Level Type | Administrative Level Division | City Name |
|---|---|---|
| High-level cities (34) | Municipalities (4) | Beijing,Tianjin,Shanghai,Chongqing |
| | Sub-provincial cities (15) | Shenyang,Dalian,Changchun,Harbin,Nanjing,Hangzhou,Ningbo,Xiamen,Jinan,Qingdao,Wuhan,Guangzhou,Shenzhen,Chengdu,Xi'an |
| | General capital cities (15) | Shijiazhuang,Taiyuan,Hohhot,Hefei,Fuzhou,Nanchang,Zhengzhou,Changsha,Nanning,Haikou,Guiyang,Kunming,Lanzhou,Yinchuan,Urumqi |
| Low-level cities (142) | General prefecture-level cities (142) | Tangshan,Qinhuangdao,Handan,Xingtai,Baoding,Zhangjiakou,Chengde,Cangzhou,Datong,Yangquan,Changzhi,Jincheng,Shuozhou,Jinzhong,Yuncheng,Xinzhou,Linfen,Lvliang,Baotou,Wuhai,Chifeng,Tongliao,Erdos,Hulunbuir,Bayannur,Ulanqab,Anshan,Jinzhou,Liaoyang,Panjin,Huludao,Hegang,Daqing,Jiamusi,Xuzhou,Suzhou,Nantong,Lianyungang,Yangzhou,Zhenjiang,Taizhou,Jiaxing,Shaoxing,Zhoushan,Taizhou,Wuhu,Bengbu,Huainan,Maanshan,Huaibei,Anqing,Huangshan,Chuzhou,Fuyang,Chizhou,Xuancheng,Putian,Sanming,Quanzhou,Zhangzhou,Nanping,Longyan,Ningde,Jiujiang,Xinyu,Ganzhou,Shangrao,Yantai,Weihai,Dezhou,Luoyang,Anyang,Xinxiang,Jiaozuo,Luohe,Nanyang,Xinyang,Jingmen,Jingzhou,Xianning,Zhuzhou,Xiangtan,Shaoyang,Changde,Chenzhou,Huaihua,Loudi,Shaoguan,Zhuhai,Foshan,Jiangmen,Zhaoqing,Huizhou,Heyuan,Qingyuan,Dongguan,Liuzhou,Guilin,Fangchenggang,Qinzhou,Yulin,Baise,Hezhou,Hechi,Sanya,Panzhihua,Luzhou,Deyang,Mianyang,Guangyuan,Suining,Neijiang,Leshan,Nanchong,Meishan,Yibin,Dazhou,Ziyang,Liupanshui,Zunyi,Anshun,Qujing,Yuxi,Lijiang,Puer,Baoji,Xianyang,Weinan,Yan'an,Hanzhong,Yulin,Jiayuguan,Baiyin,Tianshui,Pingliang,Jiuquan,Qingyang,Shizuishan,Wuzhong,Guyuan,Zhongwei,Karamay |

Note: The parentheses indicate the number of cities at this level.

**Table 4**

Descriptive Statistics.

| | Obs. | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|
| Physical capital (mean of high-level cities) | 34 | 0.664 | 0.6156 | 0.6588 | 0.7025 | 0.7056 | 0.7216 | 0.6997 | 0.6736 |
| Physical capital (mean of low-level cities) | 142 | 0.7406 | 0.6734 | 0.735 | 0.8057 | 0.8652 | 0.9062 | 0.9315 | 0.8661 |
| Human capital (ln, mean of high-level cities) | 34 | 6.3437 | 6.3663 | 6.3926 | 6.4507 | 6.4599 | 6.4931 | 6.4822 | 6.4516 |
| Human capital (ln, mean of low-level cities) | 142 | 4.4058 | 4.4288 | 4.4424 | 4.4717 | 4.5231 | 4.5629 | 4.6043 | 4.6142 |
| Government expenditures (mean of high-level cities) | 34 | 0.1259 | 0.1335 | 0.1371 | 0.1411 | 0.1408 | 0.1528 | 0.1565 | 0.1521 |
| Government expenditures (mean of low-level cities) | 142 | 0.1725 | 0.174 | 0.187 | 0.1911 | 0.1912 | 0.209 | 0.2126 | 0.2128 |
| Foreign capital introduction (USD/10,000 people, mean of high-level cities) | 34 | 411.8401 | 463.8081 | 519.8875 | 574.7773 | 582.8085 | 554.813 | 583.912 | 536.9934 |
| Foreign capital introduction (USD/10,000 people, mean of low-level cities) | 142 | 132.3146 | 151.1121 | 169.9452 | 187.4562 | 191.3295 | 178.378 | 175.3303 | 164.3202 |
| Transportation infrastructure (mean of high-level cities) | 34 | 0.0237 | 0.023 | 0.0231 | 0.0234 | 0.0212 | 0.0185 | 0.0198 | 0.0189 |
| Transportation infrastructure (mean of low-level cities) | 142 | 0.0109 | 0.0115 | 0.0119 | 0.0114 | 0.0116 | 0.011 | 0.0106 | 0.0111 |
| Financial development (mean of high-level cities) | 34 | 0.7975 | 0.7509 | 0.7633 | 0.7726 | 0.7477 | 0.7677 | 0.7763 | 0.8001 |
| Financial development (mean of low-level cities) | 142 | 0.6521 | 0.6273 | 0.6608 | 0.6907 | 0.725 | 0.7843 | 0.8279 | 0.8444 |
| Industrial structure (mean of high-level cities) | 34 | 0.8036 | 0.8372 | 0.7938 | 0.7902 | 0.7449 | 0.6903 | 0.6489 | 0.6383 |
| Industrial structure (mean of low-level cities) | 142 | 1.5515 | 1.6404 | 1.5883 | 1.4673 | 1.3394 | 1.1853 | 1.083 | 1.0222 |
| Job search competition (mean of high-level cities) | 34 | 0.2092 | 0.2304 | 0.2381 | 0.263 | 0.2704 | 0.2716 | 0.2627 | 0.257 |
| Job search competition (mean of low-level cities) | 142 | 0.089 | 0.0953 | 0.0978 | 0.1207 | 0.1196 | 0.121 | 0.1168 | 0.1134 |
| housing price (RMB/㎡, mean of high-level cities) | 34 | 7,880.54 | 8,171.90 | 8,885.24 | 9,043.82 | 9,829.72 | 11,173.39 | 12,509.62 | 14,064.56 |
| housing price (RMB/㎡, mean of low-level cities) | 142 | 4,013.84 | 4,260.38 | 4,632.01 | 4,754.79 | 4,838.53 | 4,999.25 | 5,614.89 | 6,310.71 |
| *hukou* index (mean of high-level cities) | 34 | 0.5887 | 0.5949 | 0.6051 | 0.6123 | 0.6396 | 0.6946 | 0.7152 | |
| *hukou* index (mean of low-level cities) | 142 | 0.4639 | 0.4699 | 0.4933 | 0.5045 | 0.6109 | 0.8354 | 0.8549 | |

Note: All variables use values of one period lag.

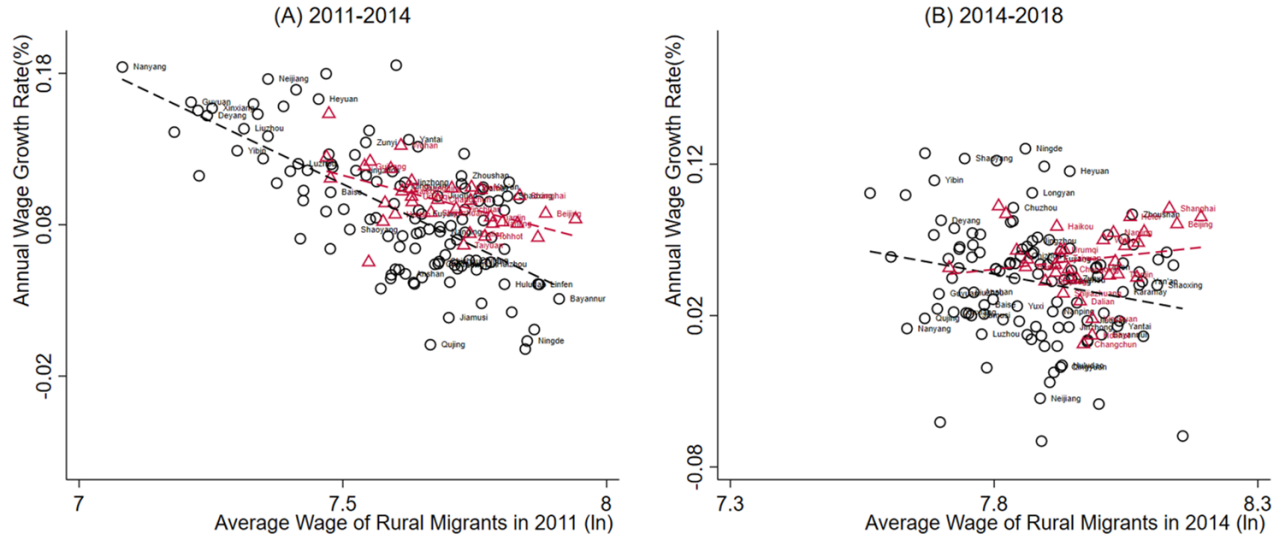
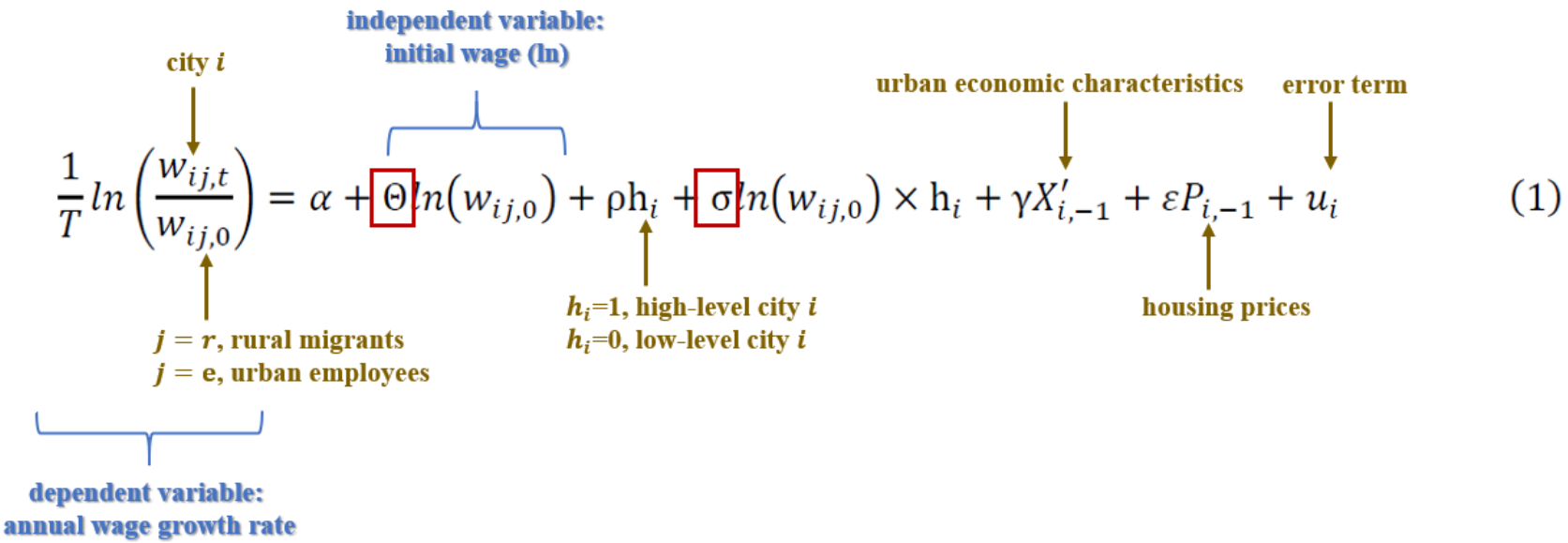



**Fig. 4. Two Stage Dynamic Trends of Relative Wage Differentials Among Cities for Rural Migrants ($\beta$−convergence).**


**Fig. 5. Two Stage Dynamic Trends of Relative Wage Differentials Among Cities for Urban Empolyees ($\beta$−convergence).**

# IV. Empirical Results

## $\beta$-Convergence OLS Regression




- Convergence coefficient of **low-level cities**: $\Theta$
- The effect of administrative level on the **degree** of wage convergence: $\sigma$
- Convergence coefficient of **high-level cities**: $\Theta + \sigma$
- If the convergence coefficient is **significantly negative**, there exits wage convergence.
- If the **absolute value** is greater, the degree of convergence is greater.

# i. Absolute $\beta$-Convergence OLS Regression Results

**Table 5**

Baseline Regression Result: Wage Convergence Among Cities.

| | β-Convergence OLS Regression | | | | | |
|---|---|---|---|---|---|---|
| | Unconditional | | Conditional | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 |
| **Panel A: Rural Migrants** | | | | | | |
| Initial wage(Wr0) | -0.2367*** | -0.1340*** | -0.2462*** | -0.1489*** | -0.2555*** | -0.1893*** |
| | (0.0197) | (0.0302) | (0.0196) | (0.0341) | (0.0194) | (0.0329) |
| High-level cities(hi) | -1.0901*** | -1.3379*** | -0.8127** | -1.1523** | -0.5182 | -0.4111 |
| | (0.2522) | (0.3675) | (0.3225) | (0.4660) | (0.3328) | (0.4139) |
| Initial wage*High-level cities(Wr0*hi) | 0.1458*** | 0.1711*** | 0.1043** | 0.1473** | 0.0652 | 0.0521 |
| | (0.0328) | (0.0463) | (0.0419) | (0.0585) | (0.0431) | (0.0520) |
| R-squared | 0.5471 | 0.1922 | 0.6323 | 0.2140 | 0.6465 | 0.3362 |
| **Panel B: Urban Employees** | | | | | | |
| Initial wage(We0) | -0.0984*** | -0.0761*** | -0.1161*** | -0.0614*** | -0.1368*** | -0.0736*** |
| | (0.0174) | (0.0139) | (0.0155) | (0.0148) | (0.0156) | (0.0163) |
| High-level cities(hi) | -0.4941** | -0.3836** | -0.5216** | -0.1903 | -0.3846* | -0.1154 |
| | (0.2076) | (0.1879) | (0.2210) | (0.1722) | (0.2070) | (0.1614) |
| Initial wage*High-level cities(We0*hi) | 0.0632** | 0.0474** | 0.0659** | 0.0243 | 0.0489* | 0.0153 |
| | (0.0257) | (0.0224) | (0.0272) | (0.0205) | (0.0255) | (0.0192) |
| | | | | | (0.0065) | (0.0055) |
| R-squared | 0.2756 | 0.2123 | 0.3485 | 0.3918 | 0.4317 | 0.4177 |
| Urban Economic Characteristics | N | N | Y | Y | Y | Y |
| Housing prices | N | N | N | N | Y | Y |
| Obs. | 176 | 176 | 176 | 176 | 176 | 176 |

# i. Absolute β-Convergence OLS Regression Results

- **2011-2018, rural migrants: the wage convergence among low-level cities changes from strong to weak.**

**Table 5**

Baseline Regression Result: Wage Convergence Among Cities.

| | β-Convergence OLS Regression | | | | | |
|---|---|---|---|---|---|---|
| | Unconditional | | Conditional | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 |
| **Panel A: Rural Migrants** | | | | | | |
| Initial wage(Wr0) | -0.2367*** | -0.1340*** | -0.2462*** | -0.1489*** | -0.2555*** | -0.1893*** |
| | (0.0197) | (0.0302) | (0.0196) | (0.0341) | (0.0194) | (0.0329) |
| High-level cities(hi) | -1.0901*** | -1.3379*** | -0.8127** | -1.1523** | -0.5182 | -0.4111 |
| | (0.2522) | (0.3675) | (0.3225) | (0.4660) | (0.3328) | (0.4139) |
| Initial wage*High-level cities(Wr0*hi) | 0.1458*** | 0.1711*** | 0.1043** | 0.1473** | 0.0652 | 0.0521 |
| | (0.0328) | (0.0463) | (0.0419) | (0.0585) | (0.0431) | (0.0520) |
| R-squared | 0.5471 | 0.1922 | 0.6323 | 0.2140 | 0.6465 | 0.3362 |
| **Panel B: Urban Employees** | | | | | | |
| Initial wage(We0) | -0.0984*** | -0.0761*** | -0.1161*** | -0.0614*** | -0.1368*** | -0.0736*** |
| | (0.0174) | (0.0139) | (0.0155) | (0.0148) | (0.0156) | (0.0163) |
| High-level cities(hi) | -0.4941** | -0.3836** | -0.5216** | -0.1903 | -0.3846* | -0.1154 |
| | (0.2076) | (0.1879) | (0.2210) | (0.1722) | (0.2070) | (0.1614) |
| Initial wage*High-level cities(We0*hi) | 0.0632** | 0.0474** | 0.0659** | 0.0243 | 0.0489* | 0.0153 |
| | (0.0257) | (0.0224) | (0.0272) | (0.0205) | (0.0255) | (0.0192) |
| | | | | | (0.0065) | (0.0055) |
| R-squared | 0.2756 | 0.2123 | 0.3485 | 0.3918 | 0.4317 | 0.4177 |
| Urban Economic Characteristics | N | N | Y | Y | Y | Y |
| Housing prices | N | N | N | N | Y | Y |
| Obs. | 176 | 176 | 176 | 176 | 176 | 176 |

# i. Absolute β-Convergence OLS Regression Results

- **2011-2018, rural migrants: taking 2014 as the turning point, the wage convergence among high-level cities turnes into divergence**

**Table 5**

Baseline Regression Result: Wage Convergence Among Cities.

| | β-Convergence OLS Regression | | | | | |
|---|---|---|---|---|---|---|
| | Unconditional | | Conditional | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 |
| **Panel A: Rural Migrants** | | | | | | |
| Initial wage(Wr0) | -0.2367*** | -0.1340*** | -0.2462*** | -0.1489*** | -0.2555*** | -0.1893*** |
| | (0.0197) | (0.0302) | (0.0196) | (0.0341) | (0.0194) | (0.0329) |
| High-level cities(hi) | -1.0901*** | -1.3379*** | -0.8127** | -1.1523** | -0.5182 | -0.4111 |
| | (0.2522) | (0.3675) | (0.3225) | (0.4660) | (0.3328) | (0.4139) |
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| | (0.0257) | (0.0224) | (0.0272) | (0.0205) | (0.0255) | (0.0192) |
| | | | | | (0.0065) | (0.0055) |
| R-squared | 0.2756 | 0.2123 | 0.3485 | 0.3918 | 0.4317 | 0.4177 |
| Urban Economic Characteristics | N | N | Y | Y | Y | Y |
| Housing prices | N | N | N | N | Y | Y |
| Obs. | 176 | 176 | 176 | 176 | 176 | 176 |

-0.0909*** 0.0371***

# i. Absolute β-Convergence OLS Regression Results

- **2011-2018, urban employees: the degree of wage convergence among low-level cities and high-level cities is basically unchanged.**

**Table 5**

Baseline Regression Result: Wage Convergence Among Cities.

| | β-Convergence OLS Regression | | | | | |
|---|---|---|---|---|---|---|
| | Unconditional | | Conditional | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 |
| **Panel A: Rural Migrants** | | | | | | |
| Initial wage(Wr0) | -0.2367*** | -0.1340*** | -0.2462*** | -0.1489*** | -0.2555*** | -0.1893*** |
| | (0.0197) | (0.0302) | (0.0196) | (0.0341) | (0.0194) | (0.0329) |
| High-level cities(hi) | -1.0901*** | -1.3379*** | -0.8127** | -1.1523** | -0.5182 | -0.4111 |
| | (0.2522) | (0.3675) | (0.3225) | (0.4660) | (0.3328) | (0.4139) |
| Initial wage*High-level cities(Wr0*hi) | 0.1458*** | 0.1711*** | 0.1043** | 0.1473** | 0.0652 | 0.0521 |
| | (0.0328) | (0.0463) | (0.0419) | (0.0585) | (0.0431) | (0.0520) |
| R-squared | 0.5471 | 0.1922 | 0.6323 | 0.2140 | 0.6465 | 0.3362 |
| **Panel B: Urban Employees** | | | | | | |
| Initial wage(We0) | -0.0984*** | -0.0761*** | -0.1161*** | -0.0614*** | -0.1368*** | -0.0736*** |
| | (0.0174) | (0.0139) | (0.0155) | (0.0148) | (0.0156) | (0.0163) |
| High-level cities(hi) | -0.4941** | -0.3836** | -0.5216** | -0.1903 | -0.3846* | -0.1154 |
| | (0.2076) | (0.1879) | (0.2210) | (0.1722) | (0.2070) | (0.1614) |
| Initial wage*High-level cities(We0*hi) | 0.0632** | 0.0474** | 0.0659** | 0.0243 | 0.0489* | 0.0153 |
| | (0.0257) | (0.0224) | (0.0272) | (0.0205) | (0.0255) | (0.0192) |
| | | | | | (0.0065) | (0.0055) |
| R-squared | 0.2756 | 0.2123 | 0.3485 | 0.3918 | 0.4317 | 0.4177 |
| Urban Economic Characteristics | N | N | Y | Y | Y | Y |
| Housing prices | N | N | N | N | Y | Y |
| Obs. | 176 | 176 | 176 | 176 | 176 | 176 |

-0.0352** -0.0287**

# ii. Conditional $\beta$-Convergence OLS Regression Results

**Table 5**

Baseline Regression Result: Wage Convergence Among Cities.

| | β-Convergence OLS Regression | | | | | |
|---|---|---|---|---|---|---|
| | Unconditional | | Conditional | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 |
| **Panel A: Rural Migrants** | | | | | | |
| Initial wage(Wr0) | -0.2367*** | -0.1340*** | -0.2462*** | -0.1489*** | -0.2555*** | -0.1893*** |
| | (0.0197) | (0.0302) | (0.0196) | (0.0341) | (0.0194) | (0.0329) |
| High-level cities(hi) | -1.0901*** | -1.3379*** | -0.8127** | -1.1523** | -0.5182 | -0.4111 |
| | (0.2522) | (0.3675) | (0.3225) | (0.4660) | (0.3328) | (0.4139) |
| Initial wage*High-level cities(Wr0*hi) | 0.1458*** | 0.1711*** | 0.1043** | 0.1473** | 0.0652 | 0.0521 |
| | (0.0328) | (0.0463) | (0.0419) | (0.0585) | (0.0431) | (0.0520) |
| R-squared | 0.5471 | 0.1922 | 0.6323 | 0.2140 | 0.6465 | 0.3362 |
| **Panel B: Urban Employees** | | | | | | |
| Initial wage(We0) | -0.0984*** | -0.0761*** | -0.1161*** | -0.0614*** | -0.1368*** | -0.0736*** |
| | (0.0174) | (0.0139) | (0.0155) | (0.0148) | (0.0156) | (0.0163) |
| High-level cities(hi) | -0.4941** | -0.3836** | -0.5216** | -0.1903 | -0.3846* | -0.1154 |
| | (0.2076) | (0.1879) | (0.2210) | (0.1722) | (0.2070) | (0.1614) |
| Initial wage*High-level cities(We0*hi) | 0.0632** | 0.0474** | 0.0659** | 0.0243 | 0.0489* | 0.0153 |
| | (0.0257) | (0.0224) | (0.0272) | (0.0205) | (0.0255) | (0.0192) |
| | | | | | (0.0065) | (0.0055) |
| R-squared | 0.2756 | 0.2123 | 0.3485 | 0.3918 | 0.4317 | 0.4177 |
| Urban Economic Characteristics | N | N | Y | Y | Y | Y |
| Housing prices | N | N | N | N | Y | Y |
| Obs. | 176 | 176 | 176 | 176 | 176 | 176 |

## iii. Mechanism of Inspection: Interaction Term Test

*hukou* index

$$\frac{1}{T}ln\left(\frac{w_{ij,t}}{w_{ij,0}}\right) = \alpha + \Theta ln(w_{ij,0}) + \rho h_i + \sigma ln(w_{ij,0}) \times h_i + AE'_{i,-1} + Bln(w_{ij,0}) \times E'_{i,-1}$$
$$+ CE'_{i,-1} \times h_i + Dln(w_{ij,0}) \times h_i \times E'_{i,-1} + \gamma X'_{i,-1} + \varepsilon P_{i,-1} + u_i \quad (2)$$

- The impact of *hukou* index on wage convergence among **low-level cities**: **B**
- The impact of *hukou* index on wage convergence among **high-level cities**: **B+D**

# iii. Mechanism of Inspection: Interaction Term Test

- **In 2014-2018, *hukou* reform in low-level cities is stronger, attracting not only urban employees but also rural migrants.**

**Table 6**

Mechanism of Inspection: Interaction Term Test.

| | Annual Wage Growth Rate | | | |
|---|---|---|---|---|
| | Rural Migrants | | Urban Employees | |
| | (1) | (2) | (3) | (4) |
| | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 |
| Initial wage(Wj0) | -0.2573*** | -0.0795 | -0.1312*** | -0.0323 |
| | (0.0422) | (0.0640) | (0.0323) | (0.0260) |
| Wj0*hi | 0.0623 | -0.1138 | 0.1020 | -0.0271 |
| | (0.0981) | (0.1046) | (0.0646) | (0.0371) |
| B Wj0*Hukou index | -0.0550 | -0.1988* | -0.0730 | -0.1169** |
| | (0.0705) | (0.1132) | (0.0613) | (0.0507) |
| Wj0*hi*Hukou index | 0.0514 | 0.2880** | -0.0123 | 0.1141* |
| | (0.1477) | (0.1271) | (0.1029) | (0.0626) |
| Urban Economic Characteristics | Y | Y | Y | Y |
| Housing prices | Y | Y | Y | Y |
| Obs. | 176 | 176 | 176 | 176 |
| R-squared | 0.6735 | 0.3912 | 0.4539 | 0.4960 |

# iii. Mechanism of Inspection: Interaction Term Test

- **In 2014-2018, in high-level cities, the restrictions on rural migrants are severe, but urban employees are expected to be attracted.**

**Table 6**

Mechanism of Inspection: Interaction Term Test.

| | Annual Wage Growth Rate | | | |
|---|---|---|---|---|
| | Rural Migrants | | Urban Employees | |
| | (1) | (2) | (3) | (4) |
| | 2011-2014 | 2014-2018 | 2011-2014 | 2014-2018 |
| Initial wage(Wj0) | -0.2573*** | -0.0795 | -0.1312*** | -0.0323 |
| | (0.0422) | (0.0640) | (0.0323) | (0.0260) |
| Wj0*hi | 0.0623 | -0.1138 | 0.1020 | -0.0271 |
| | (0.0981) | (0.1046) | (0.0646) | (0.0371) |
| B Wj0*Hukou index | -0.0550 | -0.1988* | -0.0730 | -0.1169** |
| B+D | (0.0705) | (0.1132) | 0.0892* (0.0613) | (0.0507) -0.0028* |
| D Wj0*hi*Hukou index | 0.0514 | 0.2880** | -0.0123 | 0.1141* |
| | (0.1477) | (0.1271) | (0.1029) | (0.0626) |
| Urban Economic Characteristics | Y | Y | Y | Y |
| Housing prices | Y | Y | Y | Y |
| Obs. | 176 | 176 | 176 | 176 |
| R-squared | 0.6735 | 0.3912 | 0.4539 | 0.4960 |

## iv. Mechanism of Inspection: DID Test

$$\frac{1}{T}ln\left(\frac{w_{ij,t}}{w_{ij,0}}\right) = \beta_0 + \Theta ln(w_{ij,0}) + \beta_1 \text{Treat} \times ln(w_{ij,0}) + \beta_2 \text{Post} \times ln(w_{ij,0})$$
$$+\beta_3 \text{Treat} \times Post \times ln(w_{ij,0}) + \gamma X'_{i,-1} + \varepsilon P_{i,-1} + u_i \qquad (3)$$

- **Exogenous policy impact**: the *hukou* reform **accelerated** in 2014.
- Treatment group **(Treat** $= 1$**)**: high-level cities
  Control group **(Treat** $= 0$**)**: low-level cities
- Before 2014 **(Post** $= 0$**)**: two groups have no difference in *hukou* reform.
  After 2014 **(Post** $= 1$**)**: high and low-level cities have different intensity of *hukou* reform.
- **Treatment effect**: $\beta 3$

# iv. Mechanism of Inspection: DID Test

- **After the *hukou* reform accelerated in 2014, rural migrants face stronger *hukou* restrictions in high-level cities than in low-level cities.**

**Table 7**

Mechanism of Inspection: DID Test.

| | Annual Wage Growth Rate | | | |
|---|---|---|---|---|
| | Rural Migrants | | Urban Employees | |
| | (1) | (2) | (3) | (4) |
| Initial wage(Wj0) | -0.0853*** | -0.1442*** | -0.0876*** | -0.1114*** |
| | (0.0179) | (0.0167) | (0.0110) | (0.0116) |
| Wj0*Treat | -0.0002 | -0.0018** | 0.0027*** | 0.0021*** |
| | (0.0010) | (0.0009) | (0.0007) | (0.0007) |
| Wj0*Post | -0.0025*** | -0.0020** | 0.0031*** | 0.0026*** |
| | (0.0009) | (0.0008) | (0.0005) | (0.0005) |
| Wj0*Treat*Post | 0.0010 | 0.0018** | -0.0008 | -0.0003 |
| | (0.0009) | (0.0008) | (0.0007) | (0.0006) |
| Urban Economic Characteristics | Y | Y | Y | Y |
| Housing prices | N | Y | N | Y |
| Obs. | 352 | 352 | 352 | 352 |
| R-squared | 0.4382 | 0.5309 | 0.2745 | 0.3534 |

# iv. Mechanism of Inspection: DID Test

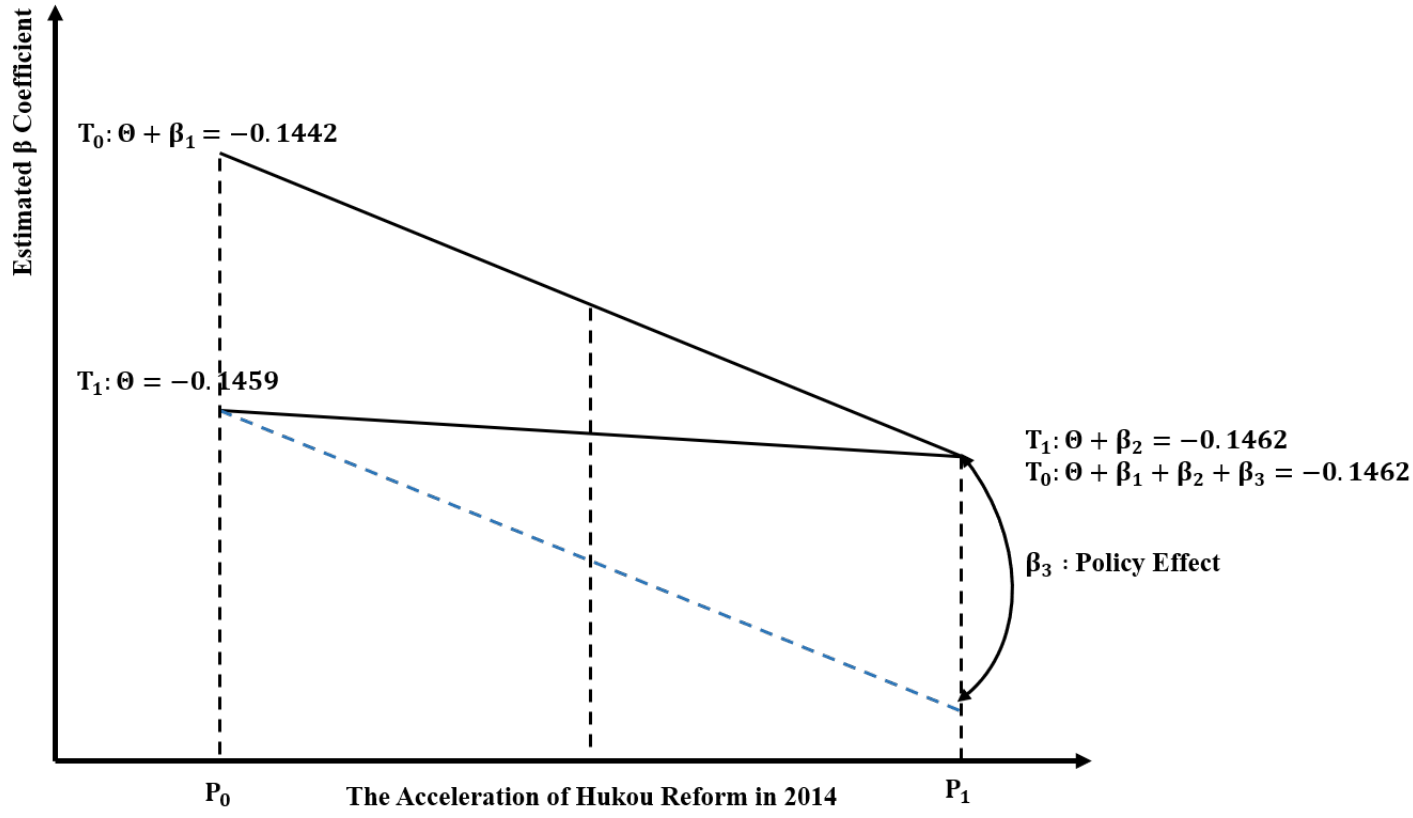


**Fig. 6. The Policy Effect of Hukou Reform Acceleration in 2014 On Wage Convergence for Rural Migrants.**

# IV. Empirical Results

**Main results:**

1. The wage convergence of rural migrants among low-level cities decreases from strong to weak, while among high-level cities, it first converges and then diverges with 2014 as the turning point.
2. The wage convergence of urban employees among low-level and high-level cities remained constant.
3. Rural migrants face stronger *hukou* restrictions in high-level cities.

**Discussion:**

1. Remove administrative barriers to labor mobility.
2. Relax the *hukou* restrictions and promote fair distribution of public welfare.

# THANK YOU!