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Urban Wage Inequality: The Reform of State-Owned Enterprises in China's Great Transition

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# Urban Wage Inequality: The Reform of State-Owned Enterprises in China's Great Transition \*

By SUN SHIYU, CHU XIXI and LIU XIANGBO\*

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## Abstract

Along with the further reforms of state-owned enterprises (SOEs), urban China has experienced an evident increase in wage inequality. Using provincial-level data for the period 1993–2013 and individual-level data from five waves of the China Household Income Project from 1988 to 2013, this paper investigates how the SOE reform affects wage distribution in urban China by considering three mechanisms: wage determination, ownership structure and institutional segmentation. The results of this study show that overall inequality increased with the reduction of SOEs' share in the economy. Moreover, through a detailed Oaxaca–Blinder re-centred influence function decomposition, this experiment obtains consistent and robust results. Based on the theory of soft budget constraint, this study demonstrates that the increase in urban wage inequality has been mainly caused by wage structure effects. Since the SOE reform in the 1980s, the wage determination mechanism has changed with the increase in the return of the labour force to education. During this period, institutional segmentation was of less significance in explaining the wage gap between SOEs and non-SOEs. Furthermore, the accelerating ageing process of China's population had no significant effects on the trajectory of urban wage inequality throughout this period.

Keywords: Wage inequality; urban China; soft budget constraint; Oaxaca-Blinder re-centred influence function decomposition

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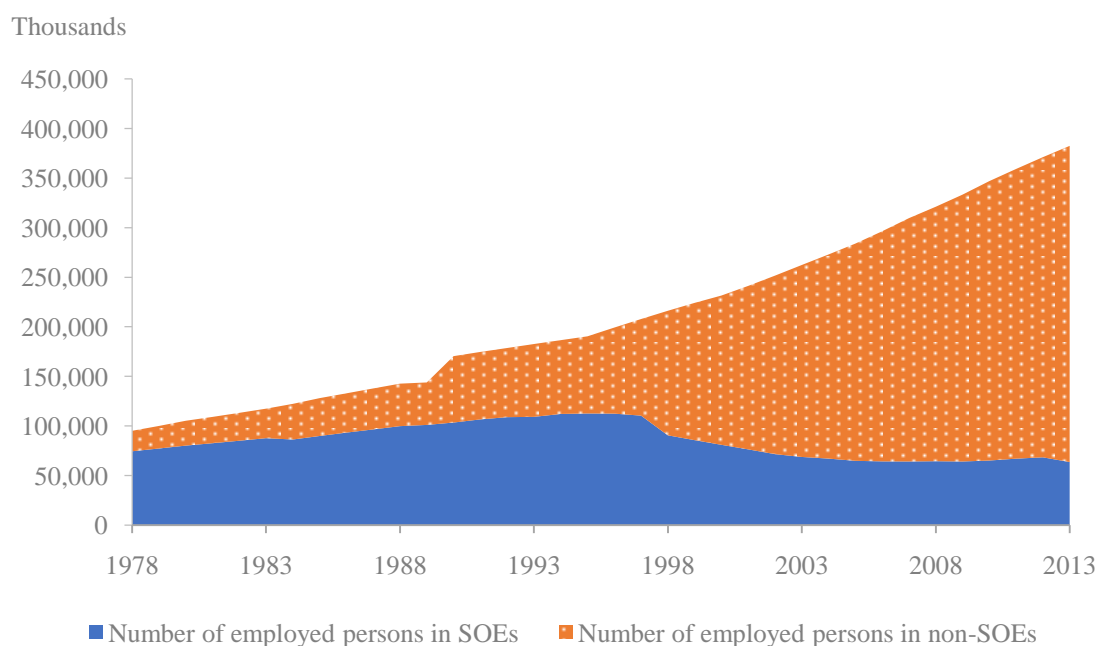
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## 1. Introduction

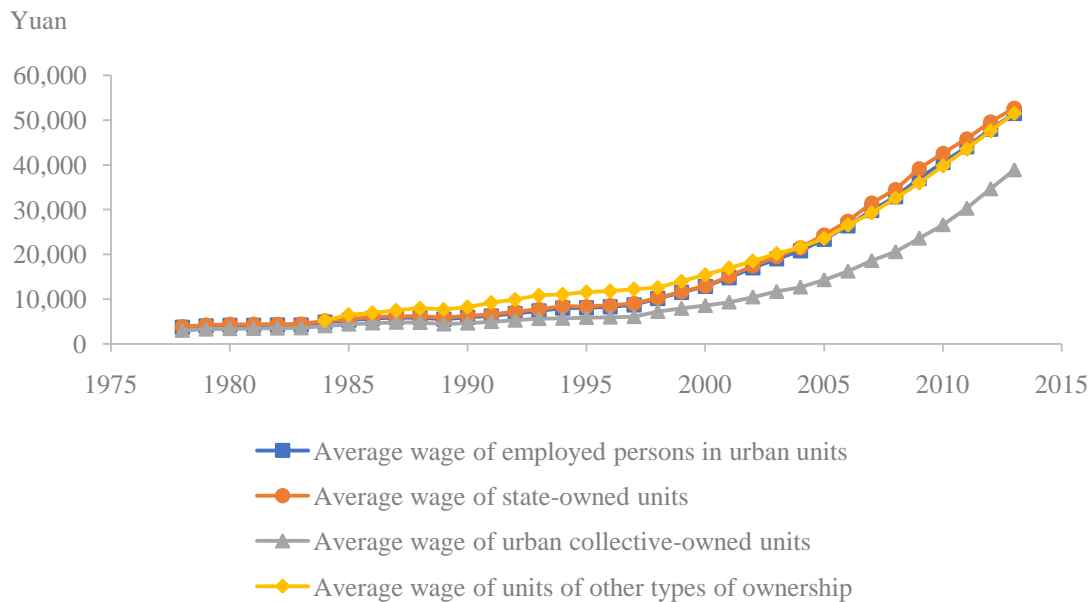
Since the economic reform of 1978, China has experienced a remarkable transition from an underdeveloped, planned economy to a bellwether of other emerging market economies. China's gross domestic product (GDP) increased from 1,230 billion yuan (in 2013 price-adjusted yuan) in 1978 to 59,296 billion yuan in 2013, accounting for 20% of the global GDP. In addition, the real GDP per capita has showed a more than 32-fold increase since 1978, reaching 43,684 yuan in 2013.

During this great transition, the reform of state-owned enterprises (SOEs) has been a major component of the overall economic reforms in urban China. Prior to the reforms, nearly the entire urban labour force worked in the state sector. During the period covered by this study, SOEs bore a heavy burden from maintaining redundant employment and large social welfare costs ([Lin, Cai, and Li 1998](#)). SOE wages had initially been determined by the national standardised grading system based on an equality criterion. Following the economic reform and opening-up of 1978, the Chinese government launched the SOE reform to improve the efficiency and performance of SOEs.

The SOE reform included two main aspects: the wage determination mechanism and the ownership reform. The Chinese government granted greater autonomy to SOE managers, redressed the labour market segmentation, encouraged the development of non-SOEs and promoted SOE privatisation over the study period. As a result, the number of workers in SOEs in urban China declined from 74 million in 1978, comprising 80% of the total employees, to 62 million in 2013, accounting for 30% of the total employees (see Figure 1). Average earnings in the state sector increased by 14 times over the same period (see Figure 2). Following the great transition, the SOE share in China's economy has declined; however, the assets of firms under state ownership still comprised the majority of the economy ([Piketty, Yang, and Zucman 2019](#)). At this point, China has established a basic market economic system to keep public ownership in a dominant position but with a development of diverse ownerships side by side.



**Figure 1.** Number of employees in urban China, 1978–2013.  
Data sources: China Statistical Yearbook, 1978–2013.



**Figure 2.** Urban wage dynamics, 1978–2013.  
Data sources: China Statistical Yearbook, 1978–2013.

However, in the course of the SOE reform, wage inequality in urban China dramatically changed. In 1988, the Gini coefficient in urban China was 0.215, but by 2013, it had grown to 0.374. The SOE reform has stood at the centre of rising urban wage inequality since the 1980s.

This article examines whether the SOE reform has caused a rise of wage inequality in urban China based on wage determination, ownership structure and institutional segmentation. Specifically, this study pursues two types of empirical analyses. The first empirical analysis is conducted at the regional level. A data panel is constructed to represent provincial-urban-level wage inequality using data from the *China Statistical Yearbook*, the *Provincial Statistical Yearbook* and the *China City Statistical Yearbook* over the period 1993–2013. Using the fixed effect model, this study reveals that there is a positive, significant relationship between the SOE reform and urban wage inequality. However, the results of the first dataset analysis do not provide a detailed story about how the SOE reform contributed to the rising urban wage inequality through various mechanisms across different periods. To get a full picture of the SOE reform, the second part of our empirical analysis is conducted at the individual level using data from the five waves of the China Household Income Project (CHIP) survey. Based on the soft budget constraint hypothesis proposed by [Kornai \(1979\)](#), this study tests three potential mechanisms behind the market reform: wage determination, ownership structure and institutional segmentation. By adopting the Oaxaca–Blinder re-centred influence function (OBRIF) decomposition, we find strong evidence that increasing wage inequality in urban China over the study period was induced by wage structure effects (including the wage determination effect and institutional segmentation effect). As the SOE reform progressed, the

return to education increased generally, and institutional segmentation between the state and non-state sectors gradually diminished. Moreover, this study also examines the effect of an ageing population on urban wage inequality. However, the results are not significant.

Increasing wage inequality in China and the reform of SOEs are among the most important phenomena associated with China's great transition. Numerous studies have examined each of these issues separately, while few have investigated these issues together. To the best of our knowledge, the present study is one of the very few to analyse the effect of SOE reforms on wage inequality in urban China during the great transition. In addition, this article appears to be one of the few thus far to identify a causal mechanism in the framework of increasing wage inequality from the perspective of soft budget constraint.

This paper proceeds as follows. The following section reviews the related literature on the SOE reform and wage inequality in urban China. The next section introduces the analytical framework and presents a brief history of China's SOE reform. The subsequent section details provincial data and the CHIP dataset. Then, it further presents our empirical analysis, including analytic strategies, with the results based on both the regional and individual levels. The final section presents conclusions.

## **2. Literature review**

The reform of SOEs is a key topic used to explore the changes of wage inequality in urban China. Based on Chinese urban household surveys, [Xu and Zou \(2000\)](#) conclude that there was increasing wage inequality with the reduction of SOE share in GDP from 1985 to 1995. [Knight and Song \(2003\)](#) demonstrate a rapid growth of urban wage inequality by decomposing the wage differentials in 1995 and 1999 and find that China's economic reform generated greater segmentation among varied types of ownership. [Dénurger et al. \(2006\)](#), by applying CHIP data, show the similar results for 1995–2002. Using the same data set, [Xia et al. \(2014\)](#) suggest that apparent changes in employment by ownership widened the urban wage gap in China from 1995 to 2002 based on the Machado and Mata decomposition ([Machado and Mata 2005](#)) method. However, for the period from 2002 to 2007, [Song and Li \(2010\)](#) demonstrate that the SOE reform narrowed the segmentation between the state and non-state sectors, with the wage structure effect accounting for more than 60% of wage differentials in 1988 but 25% in 2007.

Moreover, the changes in wage differentials by ownership are often viewed to be the key driver of the increase in inequality. [Dénurger, Li, and Yang \(2012\)](#) find that earnings gaps across ownerships had been declining over the study period. Recently, based on the quantile regression, [Gustafsson and Wan \(2020\)](#) investigate the evolution of urban wage inequality over the 1980s and 2010s and find the existence of a wage premium in the state sector.

## **3. The analytical framework and background**

This section introduces an analytical framework based on the soft budget constraint hypothesis and then briefly describes the history of SOEs from 1978 to 2013. It focuses on the reform of the wage determination mechanism and ownership structure.

### ***The analytical framework***

This study develops a theoretical framework based on the soft budget theory ([Kornai 1979](#))

to explain the trajectory of rising wage inequality. Under this framework, we propose that the SOE reform affects wage distribution in urban China through the following three mechanisms: wage determination, ownership structure and institutional segmentation.

Based on a strong soft budget constraint, there was an outstanding feature of the labour market before the market reform in China: wage setting favouring egalitarian among employees.

In a planned economy, the government sought to maximise multidimensional objectives such as equality, employment stability and social welfare. The soft budget theory implies that SOEs accepted government orders and bore such strong policy burdens in exchange for government policy protection and subsidies. SOEs tended to set wage standards in favouring egalitarian rather than performance and to guarantee the job security of workers so as to ensure stability and social welfare. In such a situation, SOEs had a lower price elasticity of factor demand. Wages did not reflect differences in workers' abilities and performances in the planned economy.

Moreover, before the market reforms in China, SOEs dominated almost all the industrial sectors and provided most job opportunities in the labour market. Meanwhile, most positions were centrally allocated in the employment of SOEs. There lacked external competition which might challenge SOEs' dominant position in the economy. Thus, the employment and wages of SOEs were less sensitive to changes of the macroeconomic environment. As a result, in the planned economy the wage differentials between skilled workers and unskilled workers were small, and the wage inequality was little.

After the market reform, the situation has changed. On one hand, less policy burden and government policy protection lead to an increase in the price elasticity of the demand for production factors. In order to survive, SOEs have to adjust the employment and wage standards according to performances, macroeconomy and market environment. On the other hand, the development of both privately-invested enterprises and foreign-invested enterprises influence SOEs. The performance-based wage determination in private enterprises and foreign-invested enterprises attracts highly skilled labour force from SOEs and in the labour market. Thus, the changes of ownership structure induce changes in the employment structure. To maintain competitiveness with their opponents, SOEs alter the employment mechanism and wage determinants.

As the wages in the public sector become less egalitarian and more sensitive to productivity, the return to education and the requirement for experience of workforce in SOEs rise. On the other hand, market-oriented employment and wage determination mechanisms decrease the welfare of unskilled workers, exacerbating the wage gap between skilled workers and unskilled workers.

Notably, with the market reforms, institutional segmentation has arisen due to weak soft budget constraints. SOEs can access funding and credit more easily supports from banks compared with their private counterparts and have a lower price elasticity of factor demand based on paternalism with the government. It cannot be presumed that SOEs determine wages and employment competitively to respond to and to reflect labour productivity. Considering the possible monopoly factors, institutional segmentation between public and private sectors can be greater. However, the differentials caused by institutional segmentation will decrease as more radical market reforms are implemented.

## ***Background***

In accordance with our analytical framework, the SOE reform in China has mainly focussed on two components: the wage setting and ownership structure.

Prior to the economic reforms of the late 1970s, there was no formal labour market in China; almost the entire labour force was employed in the state-owned and collective enterprises in urban China. Under the planned economy, the government implemented a centralised job placement system, and SOEs bore a heavy policy burden in providing employment and social security for their workforce ([Lin, Cai, and Li 1998](#); [Lin and Tan 1999](#)). The SOE wage determination mechanism was decided according to a national standardised grading system based mainly on the principles of equality and valuing seniority over education and skill ([Knight and Song 2003](#); [Meng 2012](#)). SOEs in this period were over-staffing and inefficient and had heavy social protection burdens and difficulties in turning a profit.

Since the reform and opening-up of 1978, rather than undertaking rapid and complete privatisation, the Chinese government has launched a series of gradual, incremental reforms aimed at enhancing incentives, promoting efficiency and increasing SOE profits. From 1978 to 2013, the SOE reform can be divided into three phases.

The first stage spanned 1978 to 1993, and the theme of this stage was decentralisation. The government granted more autonomy to managers of SOEs ([Yusuf, Gunasekaran, and Wu 2006](#)), whereas there was no change in the ownership and responsibilities of SOEs ([Rawski 1994](#); [Xia et al. 2014](#)). In the 1980s, the SOE reform focussed on introducing competition into management and stimulating workforce performance through variable pay and bonuses ([Coady and Wang 2000](#); [Meng 2000](#); [Shirley and Xu 2001](#)). However, at this stage, the autonomy of SOEs in wage determination was still restricted by a performance pay quota (initially, only 5% of the total wage spending). Due to remaining egalitarianism, bonuses were often distributed within work units on an average basis. On the other hand, non-SOEs were allowed to grow after 1978, marking a gradual rise of the private sector in China ([Brandt and Rawski 2008](#)).

The second stage spanned from 1993 to 2003, and the key theme of this period was privatisation. Faced with an increasingly complex overseas and domestic environment, more radical SOE reforms became imperative. The Third Plenary Session of the 14th Central Committee of the Communist Party of China formally proposed building a socialist market economic system, establishing a modern enterprise system with clear ownership, property rights and responsibilities, the separation of firm management from the government function, and scientific management. This became an important policy direction in the SOE reform, and the role of the private economy was formally recognised. The implementation of the Company Law in 1994 provided a strong legal guarantee for SOEs' privatisation. During the 15th National Congress of the Communist Party of China in 1997, state ownership was regarded as one of the 'pillars' of China's economy and, meanwhile, a push to privatise SOEs began in earnest ([Qian 1999](#)). Moreover, in 1999 China announced that the principle of SOE reforms was to 'seize the large and release the small' ([Lin 2001](#); [Xu, Zhu, and Lin 2005](#); [Hsieh and Song 2015](#)). Specifically, the Chinese government retained SOEs in strategically important industries, such as national defence, telecommunications and transportation ([Lin, Cai, and Li 1998](#)), and even strengthened larger SOEs with greater production capacity or

fixed assets. Meanwhile, the government pushed shareholding conversions for smaller SOEs, which were gradually transformed or sold to the private owners (Jefferson and Su 2006; Xu, Lu, and Gu 2014). Moreover, at this stage, the lifelong relations between SOEs and their workers began to break down, and SOEs reformed wage distribution according to workers' performance. A large number of workers were laid off or became unemployed. As a result, the number of SOE employees decreased by 50% (about 28 million) and the number of SOEs dropped from more than 120,000 in the mid-1990s to fewer than 32,000 by 2004 (Naughton 2007).

The third stage was from 2003 to 2013. In this period, the Chinese government strengthened SOEs' regulation and supervision. In 2003, the ongoing wage reform granted SOEs more autonomy in determining the level and distribution of the wages of managers and workers. However, the overall contractual regime governing wages and salaries was constructed to prevent unreasonable pay in central SOEs (Xia et al. 2014). In 2005, the government lifted the ban on the circulation of SOE equity in the stock market and promoted a further reduction of barriers to their market entry and stimulated private investment (Dénurger, Li, and Yang 2010). This equity division reform was also called the secondary privatisation (Liao, Liu, and Wang 2014). Moreover, at this stage, a rapid increase in foreign direct investment (FDI) and the rise of foreign-owned enterprises in China led to more competition in the product market (Gustafsson and Wan 2020).

#### **4. Data**

##### ***Regional-level data***

The provincial panel data were constructed from multiple sources. This study collects related information on wage inequality in urban China from the various years of the *China Statistical Yearbook*. In addition, information about SOEs comes from the various years the *Provincial Statistical Yearbook* and the *China City Statistical Yearbook*.

Since we are unable to measure urban wage inequality directly at the provincial level, we define the wage gap by calculating the differences of annual average wage growth rates between the state and non-state sectors. Furthermore, we use the share of SOEs as the indicator of SOE reforms.

##### ***Individual-level data***

This study constructs the sample from the CHIP survey, an ongoing project initiated by the China Institute for Income Distribution of Beijing Normal University. The CHIP survey contains a wealth of information on families and individuals in urban China. The CHIP survey is also a longitudinal survey and includes five waves (1988, 1995, 2002, 2007 and 2013). All the five waves cover the observations from Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Henan, Hubei, Guangdong, Chongqing, Sichuan, Yunnan and Gansu, varying substantially in geographic, economic and social characteristics. The CHIP includes an urban module, a rural module and a migrant module. There are four different ownership types: DPEs (domestic private enterprises), SOEs (state-owned enterprises), FIEs (foreign-invested enterprises) and UCEs (urban collective enterprises). Beyond this, we look into the wage elements, including the basic wage, bonus, allowance, subsidy, and overtime and special wage.



To make the samples comparable and representative, we limit our sample to the provinces covered in all the five survey waves and introduce the shares of the urban, rural and migrant population in each group to reweight the data. Moreover, to obtain precise estimations, we apply sample restriction criteria. First, we drop all individuals working in the labour market without wages and exclude the self-employed and owners of private enterprises from the analysis since our measure of wages is based on employed workers only. Second, we include people aged 16–60 years in the sample. Third, all individuals' wages are measured at their 2013 levels according to the consumer price index (CPI). Table 1 presents sample mean descriptive statistics of the main variables. It is obvious that the percentage of labour force in SOEs has declined over the great transition. This reflects the changes in ownership structure.

**Table 1.** CHIP descriptive statistics, 1988–2013.

	1988	1995	2002	2007	2013
Log value of wage	8.6577 (0.4504)	8.9735 (0.6239)	9.5278 (0.6579)	10.1534 (0.7177)	10.3694 (0.7316)
Male	0.5221 (0.4995)	0.5273 (0.4993)	0.5557 (0.4969)	0.5760 (0.4942)	0.5711 (0.4950)
Han	0.9626 (0.1898)	0.9571 (0.2027)	0.9613 (0.1930)	0.9903 (0.0981)	0.9555 (0.2061)
Schooling years	10.4466 (3.0188)	11.5591 (2.7120)	12.3426 (2.6422)	12.9922 (2.8057)	11.7341 (4.4476)
Working experience	20.3530 (10.7300)	19.3450 (9.4761)	20.3819 (9.5920)	19.7928 (10.7305)	21.7235 (11.4404)
Ownership					
DPE	0.0052 (0.0717)	0.0068 (0.0822)	0.2135 (0.4098)	0.3243 (0.4682)	0.3683 (0.4824)
SOE	0.7863 (0.4100)	0.8239 (0.3809)	0.6914 (0.4620)	0.5633 (0.4960)	0.5358 (0.4988)
FIE	0.0037 (0.0609)	0.0126 (0.1117)	0.0235 (0.1515)	0.0468 (0.2113)	0.0369 (0.1885)
UCE	0.2049 (0.4036)	0.1566 (0.3635)	0.0717 (0.2579)	0.0656 (0.2475)	0.0590 (0.2357)
Occupation					
Manufacturer	0.5369 (0.4987)	0.3941 (0.4887)	0.3010 (0.4587)	0.1722 (0.3776)	0.1269 (0.3329)
Office worker	0.2378 (0.4257)	0.2130 (0.4094)	0.3409 (0.4740)	0.4400 (0.4964)	0.4545 (0.4980)
Officer or manager	0.0651 (0.2467)	0.1170 (0.3215)	0.1113 (0.3146)	0.0754 (0.2641)	0.0561 (0.2302)
Professional or technician	0.1595 (0.3661)	0.2280 (0.4196)	0.2239 (0.4169)	0.2510 (0.4336)	0.2331 (0.4228)
Others	0.0008 (0.0275)	0.0479 (0.2136)	0.0228 (0.1494)	0.0614 (0.2401)	0.1294 (0.3357)
Industry					

Primary	0.0098 (0.0986)	0.0169 (0.1289)	0.0122 (0.1099)	0.0113 (0.1056)	0.0124 (0.1106)
Manufacturing	0.4337 (0.4956)	0.4189 (0.4934)	0.2627 (0.4401)	0.1939 (0.3954)	0.1662 (0.3722)
Mining and geological survey and prospecting	0.0404 (0.1970)	0.0104 (0.1014)	0.0592 (0.2360)	0.0102 (0.1006)	0.0372 (0.1892)
Construction	0.0349 (0.1836)	0.0295 (0.1693)	0.0334 (0.1796)	0.0343 (0.1821)	0.0427 (0.2022)
Transport/communications/post s/telecommunications	0.0684 (0.2524)	0.0503 (0.2186)	0.0796 (0.2707)	0.1393 (0.3463)	0.1424 (0.3495)
Wholesale and retail	0.1429 (0.3499)	0.1423 (0.3494)	0.1024 (0.3032)	0.1240 (0.3296)	0.0633 (0.2434)
Public utilities and real estate	0.0234 (0.1512)	0.0377 (0.1906)	0.0128 (0.1123)	0.0494 (0.2168)	0.0430 (0.2029)
Social services and welfare	0.0457 (0.2088)	0.0469 (0.2114)	0.1498 (0.3568)	0.1545 (0.3615)	0.1574 (0.3642)
Education and media	0.0733 (0.2606)	0.0754 (0.2640)	0.0942 (0.2921)	0.0819 (0.2742)	0.1086 (0.3111)
Scientific research and technical services	0.0209 (0.1429)	0.0248 (0.1556)	0.0188 (0.1357)	0.0272 (0.1628)	0.0103 (0.1012)
Finance and insurance	0.0156 (0.1238)	0.0198 (0.1394)	0.0279 (0.1647)	0.0411 (0.1985)	0.0380 (0.1913)
Public sectors	0.0851 (0.2791)	0.1206 (0.3257)	0.1262 (0.3320)	0.0921 (0.2892)	0.1439 (0.3510)
Others	0.0060 (0.0771)	0.0064 (0.0799)	0.0209 (0.1431)	0.0408 (0.1977)	0.0347 (0.1830)
N	17,212	10,597	9,322	5,766	6,861

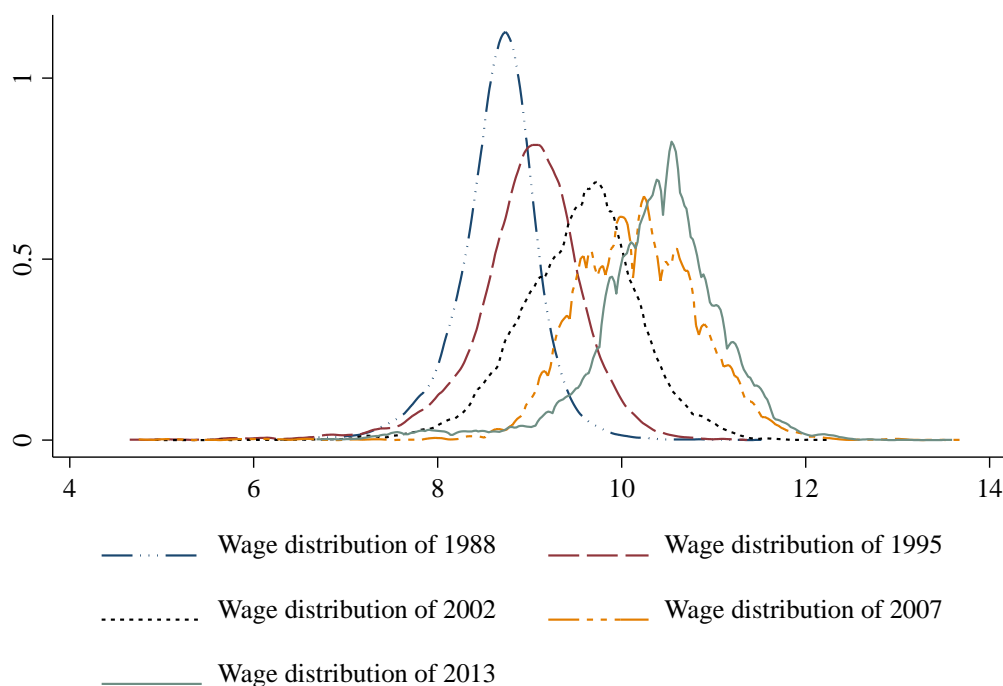
Data sources: CHIP 1988, 1995, 2002, 2007, 2013 urban household survey.

As for the changing distribution of wages, Table 1 shows a general picture of the dramatic increase in urban wage inequality from 1988 to 2013. This pattern is shown in a more direct way in Table 2. The Gini coefficient increased dramatically, from 0.2349 in 1988 to 0.3737 in 2007. Then, it decreased to 0.3419 in 2013. In addition, the kernel densities of log wages in Figure 3 very clearly illustrate that wages have grown rapidly between each pair of years under this study. It also shows that the distribution had become more unequal until 2007.

**Table 2.** Urban wage inequality, 1988–2013.

	1988	1995	2002	2007	2013
Gini coefficient	0.2349	0.2979	0.3388	0.3737	0.3419
Q90-Q10	1.0268	1.3878	1.5844	1.5834	1.5560
Q90-Q50	0.4540	0.6191	0.7189	0.7983	0.7018
Q50-Q10	0.5728	0.7687	0.8654	0.7851	0.8542
N	17,212	10,597	9,322	5,766	6,861

Data sources: CHIP 1988, 1995, 2002, 2007, 2013 urban household survey.

**Figure 3.** Wage distribution from 1988 to 2013.

Data sources: CHIP 1988, 1995, 2002, 2007, 2013 urban household survey.

## 5. Empirical analysis

In this section, we estimate how the SOE reform has empirically contributed to the increasing urban wage gap. The empirical results based on the regional-level data reveal the association of the SOE reform with wage inequality. The individual-based datasets enable us to test our analytical framework directly and provide a more comprehensive explanation by considering three mechanisms: wage determination, ownership structure and institutional segmentation.

### *Effects of SOE reforms on urban wage inequality*

This subsection presents the methodology and empirical results of the effect of SOE reforms on urban wage inequality based on the provincial-level sample. In addition, this study uses the data of the ageing population to test the robustness of our results.

### Empirical methodology

Based on the regional-level data, this study adopts the fixed effects model to analyse the effect of the increasing SOE share on earning inequality in China. The model adopted in this part follows the classical human capital theory developed by [Mincer and Polachek \(1974\)](#).

$$y_{it} = \alpha_t + \alpha_i + \beta_l share_{it} + X' \varphi + \varepsilon_{it} \quad (1)$$

where  $y_{it}$  reflects the wage inequality at region  $i$  in year  $t$ ,  $\alpha_t$  is time fixed effect, and  $\alpha_i$  is regional fixed effect. In addition,  $share_{it}$  is the share of SOEs' assets in total assets, indicating the continuous economic reform in the state sector. Thus,  $\beta_l$  is the main concern in our model, and  $X'$  are control variables that are related to the regional wage inequality. Following this, the sample we use consists of information about the wage gap, CPI, GDP, share of SOEs' assets in total assets, and the ratio of college students for the years 1988–2013.  $\varepsilon_{jt}$  is the disturbance. Standard errors are clustered at the provincial level.

In modelling the changing urban wage inequality, we can put forward several broad explanations following the previous studies. Our independent variables are divided into several categories: (1) skill-biased technological change: capital accumulation ([Berman, Bound, and Machin 1998](#)); (2) openness: trade ([Helpman, Itskhoki, and Redding 2010](#)) and FDI ([Berman and Machin 2000](#)); (3) human capital development; and (4) macro-economic policies: CPI ([Xu and Zou 2000](#)).

### Baseline results

The reform of introducing a market-oriented wage determination mechanism has enlarged wage differentials among workers. As the first column of Table 3 shows, the relationship between the share of SOEs' assets in total assets and wage inequality is significantly negative, indicating that the SOE reform has enlarged the urban wage inequality.

**Table 3.** Effects of SOE reforms on urban wage inequality.

Variables	Wage Inequality	Wage Inequality
Share of SOE	-0.0946*** (0.0335)	-0.0921*** (0.0334)
Capital accumulation	0.3264*** (0.0549)	0.3544*** (0.0574)
Trade	-0.0355*** (0.0071)	-0.0354*** (0.0071)
CPI	0.1633* (0.0831)	0.1591 (0.0830)
Share of college students	0.0294*** (0.0107)	0.0319*** (0.0108)
FDI	0.0409*** (0.0085)	0.0419*** (0.0086)
Ageing population		-0.0456 (0.0279)

Constant	4.0000*** (0.6903)	4.2787*** (0.7103)
Fixed effect	Yes	Yes
N	580	580
R <sup>2</sup>	0.2458	0.2479

Notes: \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01. Standard errors are reported in parentheses. Standard errors are adjusted for clustering at the province level. The data of Chongqing is combined with Sichuan, the data of Hainan is combined with Guangdong.

### *Robustness check*

Previous studies have focussed on the effects of a changing population structure on wage inequality. [Lam and Levison \(1992\)](#) describe how the age profile distinctly shapes earnings inequality in the US and Brazil. [Deaton and Paxson \(1994\)](#) show that, in an economy of experiencing both rapid economic growth and population ageing, the impact of population ageing on inequality is very significant. Based on Japanese household survey data from the 1980s, [Ohtake and Saito \(1998\)](#) demonstrate that nearly half the increase in income inequality in Japan can be attributed to population ageing.

Like other countries, China faces rapid population ageing. Only 9% of the population was over the age of 65 in 1990, but by 2030 this proportion is estimated at about 22%, doubling over a mere 40 years. Thus, we control for the proportion of people aged over 65 in our empirical model. The results (the second column in Table 3) show that the effect of SOE reforms is robust, but the relationship between population ageing and urban wage inequality is not significant.

### *Detailed decomposition of wage inequality*

The regression results of the last section do not fully describe the relationship between the SOE reform and wage inequality in China. To completely understand and address rising wage inequality in urban China during the great transition, we need to investigate how and why the reform has increased inequality based on the individual-level data.

### *Empirical methodology*

The Oaxaca-Blinder decomposition method has been widely used ([Oaxaca 1973](#)). However, the decomposition results based on this method have been limited to mean decomposition and suffered from a potential bias caused by different reference group settings. The OBRIF decomposition is first introduced by [Firpo, Fortin, and Lemieux \(2009\)](#) and can overcome the pitfalls of the traditional methods and thus allow us to comprehensively calculate urban wage inequality. Equation (2) is the key function of RIF, where  $Y$  is the urban wage in this study  $f(\cdot)$  is the density, and  $q_\tau$  reflects the quantile. The decomposition of unconditional quantiles  $v(Y)$  proceeds as Equation (3) presents. After the decomposition, the differences between two groups are attributed to two sections: composition effect (explained part)  $\Delta X$  and structure effect (unexplained part)  $\Delta S$ .

$$RIF(Y; q_\tau) = q_\tau + \frac{\tau - I(Y \leq q_\tau)}{f_Y(q_\tau)} \quad (2)$$

$$v^1(Y) - v^0(Y) = [v^1(Y) - v^{01}(Y)] + [v^{01}(Y) - v^0(Y)] = \Delta S + \Delta X \quad (3)$$

Moreover, by using the extended reweighting methodology ([DiNardo and Pischke 1997](#)), we reweight the wage distribution of non-SOEs workers to make it similar to that of SOEs workers. This facilitates better investigation of the SOE reform in income inequality and estimation of the possible segmentation between the state and non-state sectors.

#### *Baseline results*

We decompose the changing of the Gini coefficient into a composition effect and a wage structure effect. These results are presented in Table 4 by the categories of variables. It is clear that, for both the composition effect and wage structure effect, the SOE reform plays an important role in explaining increasing urban inequality in China. This is consistent with the results based on the provincial data analysis.

There are three comments on this result. First, increasing wage inequality in urban China over the study period was mainly induced by the wage structure effect. Second, the composition effect linked to ownership indicates changes in the ownership structure (the share of SOEs declines while the share of non-SOEs increases) had contributed to the rising urban wage inequality from 1988 to 2013. Finally, the wage structure effect results from the combination of changes in wage determination, institutional segmentation and other factors. We will estimate these three potential mechanisms empirically in the next section.

#### *Robustness check*

As in the robustness check presented in the last section, we consider the effect of a changing population structure on wage inequality in urban China. Specifically, we add the proportion of people over 65 in the total population to our empirical analyses. Our results (see the second column of Table 4) are robust, but the relation between population ageing and urban wage inequality is not significant.

**Table 4.** Detailed decomposition of inequality evolvement from 1988 to 2013.

Inequality measures	Gini	Gini (Robustnesscheck)
Overall differential	0.1070*** (0.0220)	0.1070*** (0.0201)
Composition effect	0.0427*** (0.0099)	0.0430*** (0.0094)
Wage structure effect	0.0643*** (0.0217)	0.0640*** (0.0225)
Composition effect		
Ownership	0.0233*** (0.0065)	0.0233*** (0.0065)
Schooling years	0.0026 (0.0024)	0.0026 (0.0028)
Work experience	0.0014* (0.0008)	0.0014 (0.0009)

Male	-0.0004 (0.0005)	-0.0004 (0.0005)
Han	0.0004 (0.0005)	0.0004 (0.0004)
Occupation	0.0081** (0.0038)	0.0082** (0.0035)
Industry	0.0073** (0.0036)	0.0073** (0.0032)
Aging population		0.0002 (0.0002)
Wage structure effect		
Ownership	0.1688*** (0.0255)	0.1686*** (0.0207)
Schooling years	0.0468** (0.0202)	0.0467** (0.0210)
Work experience	0.0878*** (0.0128)	0.0875*** (0.0126)
Male	-0.0092* (0.0049)	-0.0090* (0.0052)
Han	-0.0591*** (0.0221)	-0.0589** (0.0241)
Occupation	0.0173*** (0.0064)	0.0174*** (0.0059)
Industry	-0.0323 (0.0305)	-0.0324 (0.0255)
Aging population		0.0004 0.0010
Constant	-0.1558*** (0.0570)	-0.1562*** (0.0587)

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors are reported in parentheses.

### *Mechanisms*

Based on the results of the detailed decomposition displayed in Table 4, in this subsection, we estimate the Mincer function ([Mincer and Polachek 1974](#)) and decompose urban wage inequality by year to explain the trajectory of rising wage inequality. To explain rising income inequality in urban China, this paper proposes three convincing potential mechanisms: wage determination, ownership structure, and institutional segmentation.

#### *Wage determination mechanism*

In order to better understand wage determination in urban China, we estimate wage functions separately for each of the five years under study.

During the period of the planned economy, the combination of wage scales favoured seniority. The results shown in Table 5 indicate that, after the market-oriented reform, human capital has played an increasingly important role in wage determination ([Appleton, Song, and](#)

[Xia 2005](#)), and the return of the labour force to education generally increased. However, the return of the labour force to education has dropped after 2007. The explanation for the fall in the return to education may lie in the marked expansion of tertiary education starting in 1999, which reduced its scarcity value in the following decade ([Appleton, Song, and Xia 2014](#)).

In terms of the return to the value of work experience, the pattern is contrary to our theoretical framework. One possible explanation is that, in the planned economy, the SOE wage determination mechanism was decided by the government, based mainly on the principles of equality and valuing seniority over education and skills. Thus, the return to the value of work experience was higher in 1988. However, since the retrenchment within the state sector in the later 1990s, old workers were significantly more likely to be laid off than others ([Appleton et al. 2002](#)), and this caused the decline in the value of work experience among workers. Then in 2013, the return to the value of work experience bounced up.

**Table 5.** Wage determination function.

	1988	1995	2002	2007	2013
Schooling years	0.0251*** (0.002)	0.0334*** (0.003)	0.0600*** (0.004)	0.0769*** (0.006)	0.0592*** (0.007)
Work experience	0.0494*** (0.002)	0.0549*** (0.003)	0.0310*** (0.005)	0.0105** (0.004)	0.0381*** (0.004)
Square of work experience	-0.0007*** (0.000)	-0.0009*** (0.000)	-0.0003** (0.000)	-0.0001 (0.000)	-0.0006*** (0.000)
Ownership (Reference: SOE)					
FIE	0.3247*** (0.071)	0.4572*** (0.138)	0.3448** (0.122)	0.3525*** (0.102)	0.2728*** (0.049)
UCE	-0.1247*** (0.029)	-0.1805*** (0.046)	-0.2532*** (0.025)	-0.0726 (0.053)	-0.0936* (0.045)
DPE	-0.2781*** (0.085)	-0.0201 (0.179)	-0.1021*** (0.032)	-0.1258*** (0.033)	-0.0940** (0.034)
Male	0.1034*** (0.010)	0.1161*** (0.015)	0.1152*** (0.015)	0.2074*** (0.017)	0.2257*** (0.019)
Han	0.0177 (0.038)	0.0680 (0.052)	-0.0409 (0.029)	0.2859 (0.190)	0.1071 (0.062)
Occupation (Reference: Manufacturer)					
Office worker	0.0620*** (0.014)	0.0470 (0.037)	0.0038 (0.027)	0.0256 (0.027)	0.0427 (0.053)
Officer or manager	0.1110*** (0.017)	0.1387*** (0.035)	0.1641*** (0.046)	0.3403*** (0.056)	0.2440*** (0.049)
Professional or technician	0.0853*** (0.018)	0.1249*** (0.034)	0.1642*** (0.034)	0.2010*** (0.035)	0.2349*** (0.036)
Others	-0.3915*** (0.129)	-0.0532 (0.037)	-0.1699** (0.075)	-0.0917 (0.066)	0.0459 (0.053)
Industry					



(Reference: Primary)					
Manufacturing	0.0197 (0.048)	0.0263 (0.077)	-0.1122** (0.049)	-0.0029 (0.084)	0.0752 (0.058)
Mining and geological survey and prospecting	0.0084 (0.062)	0.0317 (0.103)	0.0325 (0.041)	-0.0472 (0.099)	0.1363* (0.069)
Construction	0.0372 (0.045)	0.0570 (0.079)	-0.0169 (0.101)	0.0276 (0.069)	0.1708** (0.075)
Transport/communications/post s/telecommunications	0.0809 (0.079)	0.1358 (0.087)	0.0859 (0.072)	0.0898 (0.069)	0.0718 (0.066)
Wholesale and retail	0.0404 (0.087)	-0.0166 (0.082)	-0.1733** (0.071)	-0.0337 (0.078)	0.0727 (0.072)
Public utilities and real estate	-0.0563 (0.078)	0.0548 (0.100)	0.1423 (0.091)	0.1747** (0.061)	0.0813 (0.090)
Social services and welfare	-0.0140 (0.057)	0.1220 (0.081)	-0.0580 (0.066)	-0.1066 (0.060)	-0.1089 (0.076)
Education and media	-0.0356 (0.046)	0.0991 (0.074)	0.0697 (0.050)	-0.0024 (0.061)	-0.0797 (0.075)
Scientific research and technical services	0.0171 (0.046)	0.0795 (0.095)	0.2473** (0.105)	0.0868 (0.137)	0.1845*** (0.053)
Finance and insurance	-0.0018 (0.042)	0.3029*** (0.070)	0.1722* (0.086)	0.2339*** (0.062)	0.2381*** (0.061)
Public sectors	-0.0446 (0.057)	0.0592 (0.079)	0.0601 (0.055)	0.0875*** (0.024)	-0.0464 (0.083)
Others	-0.0945 (0.080)	-0.0446 (0.057)	0.0219 (0.135)	0.1333 (0.075)	0.1056 (0.079)
Constant	7.6840*** (0.081)	7.7280*** (0.128)	8.3018*** (0.081)	8.5375*** (0.216)	8.9149*** (0.092)
N	17,212	10,597	9,322	5,766	6,861
R <sup>2</sup>	0.324	0.233	0.263	0.225	0.214

Notes: \* p< 0.1, \*\* p< 0.05, \*\*\* p< 0.01. Standard errors are reported in parentheses.

As shown in Table 5, different types of ownership tend to have distinct wage-setting mechanisms. In fact, the substantial increase in the return to skills provides a channel that leads to the overall urban wage inequality. We prove this pattern through the RIF regression by comparing the different wage determination mechanisms between SOEs and FIEs (see Table 6). This result is consistent with the literature (e.g. [Dénurger, Li, and Yang 2010](#)). Prior to the market reform, the relation between education and wages was weak in the public sector ([Gustafsson and Wan 2020](#)), and SOEs encouraged egalitarianism in wage setting during this period. [Lin, Cai, and Li \(1998\)](#) explain that SOEs bore a heavy burden from the retirement pensions and the costs of social welfare and redundant workers. During this time, the objective of SOE managers was not maximisation of profits but maximisation of the stability

and welfare of workers based on the soft budget constraint theory. [Walder \(1987\)](#) finds that even in the case of operating losses, SOEs still issued high bonuses to employees through bank loans. However, in the private sector, workers' payment was determined mainly by productivity.

**Table 6.** RIF regression based on quantile.

	Q10		Q50		Q90	
	SOE	FIE	SOE	FIE	SOE	FIE
Schooling years	0.0521*** (0.002)	0.1163*** (0.025)	0.098*** (0.002)	0.1144*** (0.012)	0.1145*** (0.003)	0.0970*** (0.015)
Work experience	0.0606*** (0.001)	0.0762*** (0.022)	0.050*** (0.002)	0.0320*** (0.010)	0.0247*** (0.003)	0.0476*** (0.013)
Square of work experience	-0.0009*** (0.000)	-0.0013** (0.001)	-0.001*** (0.000)	-0.0004 (0.000)	-0.0000 (0.000)	-0.0007* (0.000)
Male	0.0841*** (0.008)	-0.0022 (0.129)	0.098*** (0.011)	0.2228*** (0.060)	0.1741*** (0.015)	0.1976** (0.077)
Han	-0.0030 (0.020)	0.1048 (0.370)	0.063** (0.028)	0.1515 (0.172)	0.1611*** (0.037)	-0.2200 (0.222)
Office worker	0.0772*** (0.011)	0.4528*** (0.175)	0.049*** (0.016)	0.5322*** (0.081)	0.2951*** (0.021)	0.4247*** (0.105)
Officer or manager	0.1178*** (0.016)	0.1809 (0.308)	0.006 (0.022)	0.5203*** (0.143)	0.1814*** (0.030)	0.5318*** (0.184)
Professional or technician	0.0975*** (0.013)	0.4246** (0.193)	0.003 (0.018)	0.6251*** (0.090)	0.2913*** (0.024)	0.5866*** (0.116)
Others	0.2030*** (0.025)	0.3760 (0.277)	0.548*** (0.035)	0.6949*** (0.129)	0.8312*** (0.047)	0.3392** (0.166)
Manufacturing	-0.0392 (0.033)	-0.5645 (0.679)	-0.131*** (0.046)	-0.0484 (0.315)	-0.2700*** (0.062)	-0.0742 (0.407)
Mining and geological survey and prospecting	0.0740** (0.037)	-0.2414 (0.954)	0.091* (0.052)	0.0397 (0.443)	0.0984 (0.070)	0.5679 (0.572)
Construction	-0.0242 (0.039)	-0.3468 (0.842)	-0.065 (0.054)	-0.1393 (0.391)	0.0381 (0.073)	-0.4641 (0.505)
Transport/communications/post s/telecommunications	0.0631* (0.035)	0.1006 (0.697)	0.240*** (0.048)	0.2777 (0.324)	0.2504*** (0.065)	0.0224 (0.418)
Wholesale and retail	-0.1247*** (0.034)	-0.7134 (0.688)	-0.180*** (0.048)	-0.2524 (0.320)	-0.3135*** (0.064)	-0.2857 (0.413)
Public utilities and real estate	-0.0481 (0.041)	-0.5237 (0.725)	-0.024 (0.058)	0.2048 (0.337)	0.0198 (0.077)	-0.1161 (0.435)
Social services and welfare	0.0467 (0.035)	-0.5588 (0.742)	0.280*** (0.048)	-0.2644 (0.345)	0.1814*** (0.065)	-0.1249 (0.445)
Education and media	-0.0246 (0.034)	-0.4307 (0.925)	0.079* (0.048)	-0.2628 (0.430)	0.0272 (0.064)	-0.4702 (0.555)

Scientific research and technical services	0.0070	-0.4042	-0.096*	0.0362	0.0056	-0.1517
	(0.040)	(0.807)	(0.056)	(0.375)	(0.075)	(0.484)
Finance and insurance	0.1083***	-0.1362	0.408***	0.4379	0.4016***	0.3613
	(0.039)	(0.777)	(0.055)	(0.361)	(0.074)	(0.466)
Public sectors	-0.0104	-0.3668	0.089*	0.0403	0.0761	-0.2662
	(0.034)	(1.031)	(0.047)	(0.479)	(0.063)	(0.618)
Others	0.1749***	-0.7164	0.828***	-0.3787	0.7363***	-0.5324
	(0.045)	(0.777)	(0.062)	(0.361)	(0.084)	(0.466)
Constant	7.0045***	6.9807***	7.141***	7.7348***	7.9729***	9.2217***
	(0.044)	(0.863)	(0.061)	(0.401)	(0.082)	(0.518)

Notes: \* p< 0.1, \*\* p< 0.05, \*\*\* p< 0.01. Standard errors are reported in parentheses.

### *Ownership structure*

In terms of the importance of changes in ownership structure in explaining increasing urban wage inequality, the composition effect linked to ownership displayed in Table 7 captures this point. The results manifest that the proportion attributed to the ownership structure had considerably increased from 1988 to 2007. In other words, the reallocation of labours from the public sector to the private sector had played a major role in increasing urban wage inequality.

**Table 7.** The effects of the changes of ownership structure on inequality.

Inequality measures	1995-1988	2002-1995	2007-2002	2013-2007
Overall differential	0.0630***	0.0410***	0.0348*	-0.0008
	(0.0091)	(0.0131)	(0.0072)	(0.0011)
Composition effect	0.0026	0.0017	0.0109	0.0004
	(0.0035)	(0.0030)	(0.0099)	(0.0003)
Wage structure effect	0.0604***	0.0392***	0.0238	-0.0012
	(0.0085)	(0.0135)	(0.0148)	(0.0012)
Ownership	0.0014*	0.0068***	0.0091**	0.0002
(Composition effect)	(0.0008)	(0.0023)	(0.0044)	(0.0002)
Ownership	0.1583***	0.0237	0.0042	-0.0018
(Wage structure effect)	(0.0417)	(0.0431)	(0.0146)	(0.0011)

Notes: \* p< 0.1, \*\* p< 0.05, \*\*\* p< 0.01. Standard errors are reported in parentheses.

### *Institutional segmentation*

As mentioned in our analytical framework, institutional segmentation consists of two parts: one is the segmentation between SOEs and non-SOEs, and the other is the monopoly. Though we cannot identify the characteristics of the segmentation and monopoly between SOEs and non-SOEs directly due to data limitation, the wage structure effect of decomposition between SOEs and non-SOEs can capture the wage inequality caused by institutional segmentation from 1988 to 2013.

Table 8 shows that there exists a sizable institutional division between SOEs and non-SOEs. However, with the development of market reforms, the explanatory power of wage structure

effects had decreased gradually over the study period (55.38% in 1988, 45.11% in 1995, 30.76% in 2002, 29.44% in 2007, and 14.14% in 2013), which is consistent with our analytical framework.

**Table 8.** Decomposition of the wage gap between SOEs and non-SOEs.

	1988	1995	2002	2007	2013
Overall differential	0.2257*** (0.0363)	0.2984*** (0.0627)	0.3472*** (0.0382)	0.2204*** (0.0359)	0.2652*** (0.0283)
Composition effect	0.1008*** (0.0109)	0.1638*** (0.0127)	0.2403*** (0.0191)	0.1555*** (0.0306)	0.2277*** (0.0257)
Wage structure effect	0.1250*** (0.0308)	0.1346** (0.0592)	0.1068*** (0.0301)	0.0649*** (0.0245)	0.0375*** (0.0360)

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors are reported in parentheses.

The extant studies have tried to demonstrate the cause for institutional segmentation. Following the ‘seizing the large, releasing the small’ principle, the economic reform after 1999 has turned many large SOEs into firms with greater monopoly capabilities. As a result, SOEs dominate the key economic sectors, such as telecommunications, banking, energy and transportation. They have the power to steer prices and retain monopolistic profits. The wage expense in the monopoly sector is not in accordance with the marginal product of labours. Researchers confirm that the remaining monopolistic SOEs typically capture sizable rents and improve the wages of their employees through rent sharing ([Knight and Song 2003](#)). Even during mass layoffs, these firms had raised the wages of their workers ([Appleton, Song, and Xia 2005](#)). Based on the 1985-1992 firm data, [Meng \(2000\)](#) finds that retained profits were the main determinant type of wages in SOEs. The industrial or administrative monopoly is the source of the ‘premium’ in the state sector, which enjoys excess profits and uses the profits to increase the wages. This is mainly because the state-owned monopoly sector relies on the possession of resources and administrative privileges, and because it adopts non-market measures to obtain excess profits and increase employees’ wages. At the same time, through a monopolistic control of market prices, the cost of high wages and high profits within the sectors are passed directly on to consumers or the government.

## 6. Conclusions

This study uses the regional-level panel data and individual-level data from the five CHIP surveys to estimate the impact of SOE reforms on wage inequality in urban China. The results show that the overall inequality increased with the reduction in the share of SOEs. Moreover, via detailed decomposition, this study generates consistent and robust results. We construct a theoretical framework based on the theory of soft budget constraint by considering three potential mechanisms, i.e. wage determination, ownership structure and institutional segmentation, to explain these findings. Over the study period, increasing wage inequality in urban China was mainly caused by the wage structure effect. After the market reform, the return of the labour force to education has increased generally, and institutional segmentation is of less significance in explaining the wage gap between SOEs and non-SOEs. As for the

change in the ownership structure, it plays an important role in explaining the trend of wage inequality. However, an increase in ageing population has no significant effect on the trajectory of urban wage inequality.

This study has several limitations. One is the measurement error at the top of the wage distribution in the income survey (Piketty, Yang, and Zucman 2019). This may have led to underestimations of wage inequality. Another problem is that, due to sample limitations in the early rounds of the CHIP surveys, we cannot identify the effect of wage inequality on rural–urban migrants from 1988 to 2013, for which we exclude the group of rural–urban migrants in our analysis. In fact, the increase in rural–urban migrants during the study period profoundly affected urban wage inequality (Zhang and Wu 2017). Even though this sample is restricted to individuals with urban household registration (*hukou*), they have been also influenced, either positively or negatively, by the migrant population in terms of wage determination (Appleton, Song, and Xia 2014).

Considering the monetary value of *hukou*, it is difficult to determine the extent to which these results are biased (Xing 2012). Despite these limitations, however, the results of this study point to a relationship between the SOE reform and wage inequality in urban China.

Moreover, China will soon implement the ‘Three-year Action Plan’ from 2020 to 2022 to further strengthen competition and advance the privatisation of SOEs. There is no doubt that this reform will further affect the wage determination mechanism, ownership structure and institutional segmentation. Considering the potential negative shocks to the labour market caused by a continuously ageing population, future research on SOEs will thus become ever more imperative.

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