

Holding up Half of the Sky: The Impact of State-Owned Enterprise Reform on the Gender Inequality in Labor Market Outcomes in Urban China, 1988-2007

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Abstract

Contrast to most existing literature considering the existence of gender gaps as given ex ante, prior to the State-owned enterprise (SOE) reform, gender equality in labor market outcomes was enforced through the central planning labor arrangement in urban China. Between 1996 and 2001, the national SOE reform resulted in a massive layoff of over 35 million workers. The layoff intensity varies across regions, which is correlated with pre-reform regional industry composition. This paper examines the effect of the SOE reform on gender inequality in labor market outcomes. I compare individuals who resided in the relatively high layoff intensity areas to individuals in the low layoff intensity areas, instrumenting the intensity measure with the Bartik shift-share intensity index, before and after the reform. I find that the SOE reform negatively affected women's labor market outcomes substantially more than men. I find a one standard deviation increase in the reform intensity causes gender gap in employment to increase by 6.9 percentage points, the gap in retirement to increase by 6.3 percentage points, and the gender monthly earnings gap increases by 8.4%. A simple back of the envelop calculation suggests that over 50% increased gender gaps can be explained by the SOE reform. To explore whether the response to the SOE reform varied by existing gender norms, I calculate male-to-female sex ratio using under age 10 cohorts and I find that the widening gender earnings gap is entirely driven by the areas with high sex ratio. These results are consistent with the persistence of gender discrimination.

Keywords: SOE Reform, Gender Inequality, Discrimination, Transition Economies

JEL classification: J10, J20, J70.

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1 Introduction

When discussing how public policies can promote gender equality, most existing studies consider the existence of gender gaps as given. Many studies have found a fundamental role for institutional reform in promoting gender equality (King and Mason, 2001; Wong, 2012; UN et al., 2015; Niederle et al., 2013); others, however, find little evidence that the popular affirmative-action and family friendly policies have substantially reduced gender inequality (Goldin, 2014; Bagues et al., 2015; Blau and Kahn, 2016; Bertrand et al., 2014).

This paper examines a unique historical context in which gender equality was enforced through a central labor planning arrangement in urban China before the 1990s. Specifically, strict and extreme gender equality regulations were implemented during this period, which resulted in a high female labor participation rate (around 90%) and a relatively small gender wage gap - female to male earnings ratio was 88%.¹ I am particularly interested in understanding whether women were differentially affected when such strong government intervention was suddenly lifted through reform of state-owned enterprises (SOE) in late 1990s, and I utilize detailed household survey data, industry-specific employment data, employing both difference-in-differences (DID) and instrumental variable (IV) strategies to identify the causal effect of this reform.

The unique features of the period between 1950 and 1990, along with the subsequent SOE reform make China a compelling natural laboratory to study the pervasiveness of gender inequality. The principle of gender equality was not only enforced ideologically but also legally to create a socialist society before the 1990s (Booth et al., 2016). For example, Mao’s central government cultivated an ideology of “Women can hold up half of the Sky” through media and school education since 1950s. Moreover, the central planning system forcefully ensured every urban resident fulltime and lifetime employment in the SOEs.² Every urban adult was assigned a job with a fixed income under the principle of “equal job with equal pay” when they graduated; quitting or moving between firms was disallowed with very few exceptions. Most SOEs were responsible for individuals’ job arrangements, as well as the welfare of the whole family, including housing, health care, child care and sometimes

¹ Author’s calculation by using China Household Income Survey 1988 and 1995.

² Generally speaking, there are two types of firms in urban areas during that time: state-owned firms and collective-owned firms. The ownership of state-owned firms was the central government while that of the collective-owned firms was the local government or local community. In this paper, I do not distinguish between these two types of firms and define both state- and collective- owned firms as one group and refer to them as SOE.

even education. The fact that most firms failed to make a profit pushed the government to reform most SOEs in the late 1990s.

The SOE reform which happened in the late 1990s marked the end of an era in which government intervened in almost every aspects of people's lives in the urban areas.³ In 1997, the central government announced a policy to privatize, merge or close most SOEs in the urban areas.⁴ As a result, over 35 million workers were laid off in a very short period following the introduction of this policy and about 80% of enterprises were privatized by 2007 (Hsieh and Song, 2015; Smyth et al., 2001; Wu and Xie, 2003; Solinger, 2002; Meng, 2000).⁵ The massive laying off period lasted about six years, from 1996 to 2001, with the intensity varying across industries and regions. After 1997, market power played a substantially more important role in allocating labor and government intervention geared toward gender equality was essentially ended.

Although a large number of studies have documented the increased gender gaps in employment and earnings in the process of labor market restructuring, very few has established a causal link between SOE reform and gender gaps.⁶ Moreover, none has investigated whether and why women are affected differently. In this paper, I first extend existing literature to document gender gaps in employment, retirement, monthly earnings, and choices of occupations/industries to form a more complete picture of women's labor market performance in pre- and post- reform period.⁷

My main analysis exploits the variation in regional intensity of the SOE reform to identify the causal effect of this reform on gender inequality in labor market outcomes. In order to proxy the intensity of the SOE reform, I take advantage of the fact that this reform is characterized by the regional variation of massive laying off of workers and calculate the local change of employment share in the state-owned sectors as a measurement of reform intensity. I first employ DID to compare individuals in relatively high reform intensity areas to those individuals exposed to low

³China's economic reform started in 1979 in rural areas. Four Special Economic Zones were set up in the urban areas in 1980 (All are located in the coastal province, Guangdong). The central planning system was still working in most of urban China until the mid-1990s.

⁴The policy is "grasping the big, letting go of the small" (*zhua da fang xiao*).

⁵The term *xiagang* (step down from the post) was used instead of "laying off" in China to describe someone was being forced to leave his working unit because it was politically sensitive to say someone was laid off in a socialist society. Sometimes, firms forced workers to retire early, so early retirement is another form of laying off during that period.

⁶Literature finds gender earnings gap is about 9% before the reform and 14%-20% after the reform. These papers are summarized in the literature review section.

⁷Most previous studies investigate labor force participation and wages as outcomes (Gustafsson and Li, 2000; Shu and Bian, 2003; Whalley and Xing, 2014; Meng, 2012).

laying off intensity, before and after the reform.

Although the change of employment share in the state-owned sectors captures the key features of SOE reform, it may suffer from endogeneity. For instance, the outcome of employment and the local change of SOE employment share are simultaneously determined. Moreover, if private firms are more likely to enter the markets where the male workers were more productive, the firm entry could correlate with the change of SOE employment share and the gender gap in employment.

To address these endogeneity concerns, I implement an IV strategy, predicting the laying off intensity with a measure of pre-reform industry composition, augmented by the national industry-specific change of SOE employment share. This Bartik shift-share instrument has been widely used to study labor market issues in developed countries' context (Bartik, 1991; David et al., 2013; Basso and Peri, 2015) and to study regional growth questions in China (Luo and Xing, 2015; Dong, 2016; Ha et al., 2016), but this is the first study which compiles a detailed pre-reform industrial employment data set to study gender inequality in China. The intuition behind this instrument is straightforward. The SOE reform was targeting all state-owned sectors in the urban areas, but the pre-determined differential importance of each industry in the economy generated the regional variation of laying off intensity. For example, if some areas specialized in mining in the pre-reform period and the state-owned mining sector experienced a large decline in the employment nationally, I would expect those areas to have a high laying off intensity.

Overall, I find the SOE reform causes an increase in gender inequality in the labor market. My DID estimate results suggest that the SOE reform can explain 13.3%- 24.5% increase in the employment gender gap, 23.7% - 31.6% increase in the retirement gender gap, and 33% - 36.4% increase in the monthly earnings gender gap. My IV estimation produce similar results. A one standard deviation (20%) increase in the reform intensity causes gender gap in employment to increase by 6.9 percentage points, in retirement to increase by 6.3 percentage points, and the gender monthly earnings gap increases by 8.4%. A simple back of the envelop calculation suggests that over 50% increased gender gaps can be explained by the SOE reform. Another interesting finding is that the employment and retirement results are almost entirely driven by the relatively old cohort (age between 40 and 54), however, the increased gender monthly earnings gap is detected among the young cohort (age between 30 to 40). Younger and older cohorts are not affected by the SOE reform in monthly earnings. Moreover, men are not affected by the SOE reform in all three

outcomes: employment, retirement and monthly earnings.

I also find working industries, occupations, household income, and the existence of child under age 6 can hardly explain the increased gender earnings gap. Therefore, it is interesting to see if the response to the SOE reform varied by existing gender norms. Current literature suggests that regional variation in sex ratio is associated with the differential gender discrimination culture (Qian, 2008; Alesina et al., 2013; Xue, 2015). So I use 1990 census to calculate the sex ratio of the birth cohorts who were under age 10 and I find my monthly earnings results are almost entirely driven by the high sex ratio areas. More details about the variation of sex ratio across regions will be discussed in section 6.3. This suggests that cultures with traditional attitudes about the appropriate roles of women may play an important role in the deterioration of women's status in the labor market in the process of transforming from a central planning system to a market-oriented economy.

This paper is organized as follows. Section 2 discusses the related literature. Section 3 introduces the institutional background on gender equality-related cultures and government policies in the pre-reform period and the SOE reform in the 1990s. Section 4 describes data source. Section 5 presents the methodology and the validation of the identification strategy. Section 6 provides the main regression results. I also discuss the potential mechanism-gender discrimination. Section 7 discusses other possible confounding events and tests parallel trend assumption. Section 8 concludes.

2 Related Literature

My paper contributes to a large number of literature which studies the issue of gender gaps in urban China. My study has several advantages. Firstly, most of the existing papers do not discuss the causal relationship between SOE reform and the increased gender gaps. For instance, some studies simply compare the gender earnings gap between 1980s and 1990s without discussing any mechanisms (Gustafsson and Li, 2000; Shu and Bian, 2003; Millimet and Wang, 2006); others present some descriptive evidence to suggest there might be a link between SOE reform and increased gender earnings gap without identification strategy (Whalley and Xing, 2014; Meng, 2012). Also, several studies use Oaxaca decomposition method to explore which factors contributing to the sizable gender earnings gap and conclude that after controlling for a series of individual characteristics

and occupations/ownership/industry, there is still a large unexplained part of gender earnings gap (Bauer et al., 1992; Liu, 2011; Ni et al., 2005; Su and Heshmati, 2011; Shi et al., 2011). Generally speaking, these papers suggest that education plays a more important role in determining workers' wages in the post- than pre-reform period, ownership of the industry can explain part of the increased gender earnings gap. But less than 50% of the gender earnings gap can be explained by the observed individual characteristics, and most studies agree with the existence of discrimination and/or unobserved productivity differences without providing further evidence (Cai et al., 2008).

The most relevant study is by Jenq (2015). In this paper, the author uses 1990, 2000 and 2005 census data, employing seemingly-unrelated regression (SUR) and OLS regression to study the effect of SOE reform on the aggregate level change of gender gap in employment. The author calculates prefectural change of SOE employment share and change of female employment share and argue that these are exogenous in China's setting. She finds that female industry-biased privatization can explain almost 50% of the increase in the employment gender gap. My study distinguishes from this paper in several aspects. First and foremost, I rely on time and regional intensity variation, employing both DID and IV strategies to establish a reliable causal link between the privatization movement and gender gaps. Jenq's paper does not have any further identification strategy except assuming that the change of employment share is exogenous. As I have discussed the endogeneity concern of this measurement, her assumption without identification strategy would be biased. Secondly, I am particularly interested in understanding whether females are affected differently due to this SOE reform, not the aggregate level change of gender gap. The increased gender gap could be resulted from an increase in male employment or a decrease in female employment, or decrease in both but women negatively affected more. Only looking at the aggregate level change will not convey women's relative economic performance in the labor market. Lastly, I use four waves detailed household survey data to investigate more individual outcomes, including employment, retirement, earnings and so on. While the paper by Jenq mainly uses census data to look at the aggregate employment as outcome.

Bartik instrument has been widely used to study labor market issues in many developed countries' setting (Altonji and Card, 1991; Card, 2001; Basso and Peri, 2015; David et al., 2013), but due to data availability, my study is the first one which compiles a detailed pre-reform industry-specific employment composition data set from a large number of sources to investigate gender related labor

market outcomes in China.

My paper is also related to recent studies on the impacts of government intervention on gender inequality and the historical origins of gender roles. Starting from Norway in December 2003, Spain, Iceland, Italy, Finland, France, and the Netherlands have all passed similar reforms requiring some specific percentage (eg, 40% in Norway) of representation of each gender on the board of directors of publicly limited companies. Bertrand et al. (2014) did not find evidence that this policy reduces the gender wage gap or increases female representation in top positions. Furthermore, they find little evidence that the reform affected the major, marital or fertility decisions of young women. On the other hand, Alesina et al. (2013) and Hansen et al. (2015) emphasize the importance of pre-modern agricultural activities in shaping contemporary gender roles and attitudes. My study complements this strand of literature. More importantly, the strict residence registration system and the uniform central labor arrangement across the whole urban area before the reform provides a natural laboratory in which to examine the effectiveness of enforced gender-equality actions. The results from my paper suggest that even a over 40-year long labor market intervention and the movement of cultivating gender equality ideology cannot fully change people's attitudes toward the appropriate roles of men and women in society.

My paper also speaks to a vast literature on the effects of the reforms that happened in the transitional economies. The path that China followed in transforming from a central- planning, socialist economy to a market economy is similar to the reunification of Germany. Also, the SOE reform belongs to the worldwide privatization movement in the 1990s.⁸ Many contributions to the existing literature have discussed the change of gender inequality after the reunification of Germany (Burda and Hunt, 2001; Hunt, 1997; Danthine and Hunt, 1994; Hunt, 2004). They find that although the gender wage gap narrowed after reunification, women were more likely to leave the labor market. My finding is consistent with these descriptive results. One advantage of my study is that the SOE reform introduces a sharp change to the labor market in China, which provides a good opportunity to identify the causal effect.

⁸Refer to Megginson and Netter (2001) for a thorough review.

3 Institutional Background

In this section, I describe the history and change of women's status in Chinese society before and after the Communist Party came to power. I discuss the emergence, implementation and abolishment (SOE reform) of the enforced gender-equality actions in the urban areas. These historical events motivate my identification strategy as well as the explanations of the findings.

Pre-Communist Ruling Period Women's position in marriage, family and society had been mostly defined by Confucianism for nearly two thousand years before the Communist Party came into power in 1949 in China. For example, women were expected to follow the Three Bonds of Obedience: "To obey fathers when young, husbands when married, and adult sons when widowed." This outlook had fundamentally permeated Chinese culture and religion (Johnson, 2009). Hence, women were labeled as submissive, passive, and weak, and the appropriate role for them was to stay at home. Traditional gender norms also resulted in strong preferences for sons. However, the establishment of a communist government in 1949 followed by a series of social, economic and political experiments under the Marxist ideas to create a socialist society, promoted women's rights and their position in the society (Entwisle and Henderson, 2000).

Communist Ruling Period The unique feature of the period from 1950 to 1990 in China is that women's social status was strongly shaped by the political approach. Many pervasive reforms that were in favor of gender equality took place. The 1950 Marriage Law and the 1954 enacted Constitution abolished polygamy, child betrothal, and interference in the remarriage of widows (Meijer, 1971). For the first time, the 1950 Marriage Law legalized that wife and husband enjoy equal status at home and marriage should be based on the complete willingness of the two parties. Later on, the Anti-Confucianism Cultural Revolution that happened between 1966 and 1976 denied all traditional ideas about women and the central government used every possible method, including newspaper/TV/radio, school education, and books to propagate Mao's "Women can Hold Up Half of the Sky" ideology. Besides implementing a new law to target gender equality within the marriage and cultivating the new ideology that women could contribute as much as men to the development of society, starting from 1950s, the Chinese government established a strict central planning system to arrange labor under the ideal of Marxist equality. As a result, the labor force participation rate

of women was extremely high in urban areas and the gender wage gap was kept at a level that was smaller than that of the United States and most OECD countries.⁹

The Marxist equality idea that was realized through the labor arrangement played a central role in redefining women's status in the society (Entwisle and Henderson, 2000). First, the labor arrangement and wage rate were completely centrally determined in the urban areas. One important reason for this system functioning is that the strict residence registration system, known as *hukou*, almost prohibited any migration between rural and urban areas. China's economy was divided into two mutually exclusive parts until the late 1980s. Each year, the State Ministry of Labor and Personnel assigned employment and wage quotas to each local government. Eventually, the labor quota would reach the educational institutions and the wage quota would be assigned to each state or collectively-owned firms or government departments. When an individual graduated, he/she would be assigned to a work unit mainly based on his/her educational attainment and political background.¹⁰ No one would be allowed to search for a job themselves and no work unit could choose workers independently (Meng, 2000; Liu et al., 2008). What is more, individuals were not allowed to quit or change their jobs except for promotion. This was a life-time employment with an accurate fixed wage. There were 8 wage levels for factory workers and technicians and 24 levels for administrative and managerial workers, with some variations across regions (Meng, 2000). The goal of the firms was not to maximize profit, instead they functioned as many independent small societies. They not only provided workers with employment but also housing and medical treatment for family members, and child care and even education for the children. Due to the mandated equal labor attachment and instituted equal pay for equal job for men and women, China has kept most formal institutions that guaranteed gender equality during that period. No doubt, these socialist policies had shrank the absolute size of the gender gap and transformed the gender norms to a large extent in contemporary China (Eichen and Zhang, 1993; Hannum and Xie, 1994; Yang, 1999; Xue, 2015).

Post-1990s, Period of SOE Reform The economic reform started in the rural areas with the fast growing township enterprises and later on the set-up of four Special Economic Zones along

⁹The female labor force participation rate was around 90% among 19 to 54 age groups, and the gender wage gap was about 12% based on the author's calculation, compared to about 30% in United States from the existing literature (Blau and Kahn, 2007, 2016).

¹⁰Generally speaking, political background indicates the length of an individual had been a the Communist Party.

the southeastern coast of China.¹¹ When it entered the mid-1990s, the prosperous development of the private firms in the rural areas and the expanding foreign and export-oriented private firms in the coastal Economic Zones aggravated the failure of the SOE in most urban areas. Lacking a mechanism to incentive workers and the autonomy of market pricing, the main reason for SOE' barely surviving prior to market reform was the monopoly power created by the political intervention. Once the the political intervention evaded, it was almost impossible for them to compete with other private firms (Lin et al., 1998; Lin and Tan, 1999; Perkins, 1994).

In the middle of 1990s, about half of these SOE were making losses and the number of redundant workers was estimated to reach as high as 20%-30% of total workers (Xianguo, 2007). SOE reform was politically sensitive because life-time employment and equal pay with equal jobs were regarded as two key characteristics of socialist society, the central government did not endorse the SOE reform until the 15th Communist Party Congress in September 1997 (Frazier, 2006). The *zhuada fangxiao* ("grasping the big, enlivening the small") policy was announced at this Congress. The key component of the reform is to keep only a few large strategic sectors under the state ownership and merge, privatize or close most other medium-to-small firms. As a result, over 35 million workers were laid-off (Smyth et al., 2001; Chao, 2000; Zeqi and Yongnian, 1998).

The privatization movement started in 1996, featuring the appearance of early retirement. Massive laying off happened in 1997 and lasted about five years.¹² The data from the National Bureau of Statistics suggests that the employment of SOE peaked at about 109.5 million in 1995 before falling to 69.2 million at the end of 2002, a 36.8% decline (Yearbook, 1998, 2003). The most affected sectors were manufacturing, mining, and utilities, which fired 65% employees, the total number of employees in these sectors dropping from 44 million in 1995 to 15.5 in 2002 (Yearbook, 1998, 2003). Another stunning decrease is in the number of firms. The total number of industrial state-owned enterprises declined precipitously by 54.7%, from 110,000 in 1997 to 53,489 by late of 2000 (Yearbook, 1998, 2003). The urban collective firms, which were owned by the local government, were also in the scope of the SOE reform. The shrinking of the collective firms shares a similar pattern with the state-owned enterprises. For example, the number of industrial workers fell from

¹¹Township enterprise are another form of collective-owned enterprise, but the ownership belongs to farmers in the rural areas.

¹²There is another term to describe lay offs during that period in China: *xiagang*, which means that workers were forced to leave, but still maintain ties with their enterprise.

14.9 million in 1995 to 3.8 million in 2002 (Yearbook, 1998, 2003).

To summarize, within 5-6 years, the central planning labor arrangement was abolished. After the SOE reform, all firms worked toward the goal of profit maximization and were free to hire or fire workers from the growing labor market. New entrant workers no longer enjoyed the non-contract life-time employment, and their wages were determined by the market forces. Although the new SOE still have some monopolistic power in some specific sectors, they do not bear any other social responsibilities as before (Lee, 2000; Solinger, 2002).

Laid off workers were entitled to receive living allowance and unemployment benefits from the government to maintain a minimum living standard. In the meantime, the central government announced some particular policies, such as tax reduction or lower loan interest rates for private firms which hired laid off workers from the SOE, to help these workers search new job in 1999. However, the government admitted in a public report that these policies were not working well in helping laid off workers re-enter the labor market. Current study suggests that only about 34% of individuals experiencing job separations between January 1996 and November 2001 were employed again within 12 months of leaving their jobs (Cai et al., 2008).

4 Data

This section provides detailed information about the dataset I have used and the construction of the intensity of the SOE reform.

4.1 Outcome Variables

The data used in this study comes from the survey of the China Household Income Project: 1988, 1995, 2002 and 2007. This household survey project, including both rural and urban households, was designed by the Economics Institute of the Chinese Academy of Social Sciences(CASS) and a group of international economists. The provinces, number of households and individuals covered by the project vary across years. In 1988, 9,009 households with 31,827 individuals living in 10 provinces were surveyed (Eichen and Zhang, 1993). In 1995, the research team surveyed 6,931 households and 21,698 individuals in 12 provinces (Li et al., 2008). The 2002 survey covered the same provinces as 1995, including 6,835 households and 20,632 individuals (Li et al., 2008). Sixteen

provinces were surveyed in 2007, but only 9 provinces with a total of 14,683 individuals and 5,000 households are available for public use (Luo et al., 2013). Since the central labor arrangement was implemented in the urban areas and the SOE reform mainly targeted those firms that were located in the urban areas, I restrict my analysis to individuals who had urban *hukou* (Meng, 2000; Groves et al., 1995; Perkins, 1994). Also, the mandatory retirement age for men was 60 and 55 for women during that time period, so I focus my study on individuals between ages 19 and 54 (Du and Dong, 2009; Giles et al., 2006a).¹³ The final dataset in my empirical analysis includes 24,706 households with 52,947 individuals across 14 provinces and 80 prefectures.

CHIP has detailed information about individuals' demography, working status and income. Individuals were surveyed on their age, ethnicity, educational attainment, employment status, working industries, occupations, monthly earnings and other information related to income.¹⁴ I use the answers to the employment status question to define both employed and retired dummy outcomes. Employed equals 1 if the individual reports he currently has a full time job and 0 otherwise; retired equals 1 if the person says he is retired and 0 otherwise.¹⁵ I define earnings as the sum of regular wages, all kinds of bonuses and subsidies, and other income from the primary job.

Table 1 shows the summary statistics of key outcome variables and individual characteristics. Panel A shows the average labor market outcomes before (1988 and 1995) and after (2001 and 2007) the SOE reform. Monthly earnings were adjusted by CPI to 2014 year. The real average monthly earnings had increased more than six folds in post- than pre- reform period. This is not surprising since China's economy was growing at an average of 9.91% per year during that time period. On the other hand, the employment rate declined from over 90% to just about 70% among working-age adults in the sample. Also, more people reported that they were "retired". As I discussed before, early retirement has been used as another method to lay off workers in the SOE restructuring process. Another noteworthy feature about the change in the labor market is that very few people were working in the private sectors before the reform (about 2%). The proportion

¹³The retirement age for women varied across educational attainment and occupations. The youngest age at which women were legally allowed to retire was 45 (Du and Dong, 2009; Giles et al., 2006b). Later on, I expand my study group to age 60 as a robustness check.

¹⁴In 1995 and 2002, individuals were also asked their working hours per week.

¹⁵There are eight answers to the survey question: "What is your current employment status?" (1) employed (full time job); (2) waiting for job; (3) unable to work; (4) retired; (5) currently a student; (6) pre-school children; (7) full time homemaker; (8) others. In the 2002 survey, there are several categories in addition: (1) officially off-duty (*lixiu*); (2) laid-off (*xiagang*); (3) *ligang* (left post); (4) early retirement; and (5) internal retirement. I group (1), (4) and (5) to "retired"; (2) and (3) as "others."

grew to more than 50% after the reform. Additionally, there was no difference in the likelihood of sorting into private sectors between men and women, but women were 7.1 percentage points more likely to sort into private sectors after the reform. Such drastic changes not only conveys the strict implementation of Mao's socialist ideology in the pre-reform period but also shows the fundamental change of the structure of the economy after the SOE reform. Panel B compares the individual characteristics before and after the reform. Workers are more educated in the post-reform period. Both age and education level could affect labor market outcomes, therefore, it is necessary to include these variables as controls in our analysis.¹⁶

4.2 SOE Reform Intensity Measurement

Since the SOE reform occurred at the national level, I cannot simply compare post-reform outcomes with pre-reform outcomes. The changes in labor market outcomes could be due to multiple reasons, other than SOE reform. For example, increasing retirement could be simply due to an age-demographic shift or caused by an increase in household income. Therefore, in order to assess the causal effect of SOE reform on gender inequality in the labor market, I employ difference-in-differences method. I compare outcomes before and after reform for individuals from the more affected areas to the less affected areas. I first define reform intensity using the change of the SOEs employment share in the urban areas. The higher the change in employment share, the higher the reform intensity.

The employment data comes from various official statistical publications and publicly-available databases.

- National and Provincial number of SOE workers in each industry and total number of workers in the urban areas are collected from the China Labor Statistical Yearbook 1996, 1995, 2002 and Comprehensive Statistical Data and Materials on 50 Years of New China .
- Prefectural number of SOE workers by industry and total number of workers in the urban area are extracted from 14 Provincial Statistical Yearbook 1996 and, 1995 and China City Statistical Yearbook 1996, 1995, and 2002.

¹⁶Not every wave of the surveys ask the working experience question, I define working experience = age - years of schooling - 6. Later on, in the regression analysis, due to the multicollinearity issue between years of schooling, working experience, and age, I only include age and years of schooling as controls

Figure 1 describes the change in the labor force in SOE sectors between 1988 and 2013. Before 1990, almost all urban workers were working in state-owned sectors. Then, the share gradually decreased. The sharp decrease started in 1997, when the SOE reform policy was officially announced and firms started to lay off workers. The massive laying off lasted about six years, between 1996 and 2001. After that, SOE no longer dominated the economy. In 2013, fewer than 40% of total workers were working in any SOE sectors. Such change suggests that China was transforming from a central planned economy to a market-oriented economy.

In order to measure the SOE reform intensity, I collect the total number of workers (*Zhi gong*) and the number of workers in the SOE sectors in 80 prefectures (covered by the CHIP data set) for the years 1995 and 2001. Prefectures, which encompass all metropolitan areas in China, are logical geographic units for defining local labor market. I calculate the change of the SOE employment share as:

$$\Delta \text{ SOE Emp share}_p = \frac{L_{p,t_0}^{SOE}}{L_{p,t_0}} - \frac{L_{p,t}^{SOE}}{L_{p,t}}$$

In this expression, L_{p,t_0}^{SOE} ($L_{p,t}^{SOE}$) is the start (end) of period SOE employment in prefecture p and L_{p,t_0} ($L_{p,t}$) is the start (end) period total employment in prefecture p. A positive $\Delta \text{ SOE Emp share}_p$ suggests that the share of workers working in the SOE sectors is decreasing over the years and vice versa ¹⁷

Figure 2 shows the regional variation of the SOE reform intensity. The darker the color, the more workers left the public-owned sectors between 1996 and 2001. The average change of SOE employment share is 0.31 with the standard deviation 0.12.

The major concern of using the change of SOE employment share to measure intensity is it could be correlated with some unobserved prefectural characteristics which affect the labor market outcomes. For instance, the outcome of employment and the local change of SOE employment share are simultaneously determined. Moreover, if private firms are more likely to enter the markets where the male workers were more productive, the firm entry could correlate with the change of SOE employment share and the gender gap in employment. To overcome this endogeneity issue, I collect the pre-reform number of SOE workers in each industry (two-digit) at the prefectural level from

¹⁷89 out of 293 prefectures were covered in CHIP. Due to the change of geocode, I am able to identify 80 prefectures.

various provincial statistical yearbooks. By using the pre-reform prefectural industrial composition and national industry-specific shock to the SOE employment caused by the SOE reform, I develop a Bartik intensity index to instrument the prefectural change of the SOE employment share.¹⁸ Due to the data availability, I compile an employment data set that covers 37 prefectures across all 14 provinces. The Bartik intensity index is constructed as follows:

$$\text{Bartik Intensity Index}_p = \sum_{i=1}^n \text{SOE Emp share}_{i,p,t_0} * \Delta \text{SOE Emp share}_i$$

Where $\text{SOE Emp share}_{i,p,t_0}$ is the start of period SOE employment share in industry i and prefecture p . $\Delta \text{SOE Emp share}_i$ is the aggregate change of SOE employment share in industry i between the start and the end period.

Figure 3 shows histograms of the distribution of the change of SOE employment share both for all 80 prefectures and the subsample (37 prefectures) with the available pre-reform industry specific number of SOE workers. The mean of the subsample is 0.33 with standard deviation 0.13, which is marginally larger than the total sample mean (0.31 with the standard deviation 0.12).

Table 2 shows the summary statistics of the pre-reform share of SOE workers by industry across the 37 prefectures. First, manufacturing plays the most important role in the old central labor arrangement system, and wholesale and retail trade comes next. Second, the standard deviation is relatively small across most industries, which suggests the central government significantly intervened in the economy to build a homogenous market regardless of the local differential endowment. I report the national industry-specific change of SOE employment share in Table 3. Manufacturing lost most workers working in the SOE. The SOE also substantially shrank in the mining, construction, real estate and wholesale sectors. Lastly, Table 4 summarizes both the change of SOE employment share and the Bartik intensity index. I will present the correlation between the change of SOE employment share and Bartik intensity index in the next section when I discuss my main identification strategy.

¹⁸Bartik instrument was first introduced by Bartik (1994), and used in papers such as David et al. (2013), Card (2009), Basso and Peri (2015) and so on.

5 Methodology

5.1 Descriptive Evidence

I first document a complete picture of the change of women’s economic activities, simply comparing before and after the SOE reform. The labor market outcome is specified as: For individual i in prefecture p and year t ,

$$Y_{ipt} = \alpha + \beta_1 Female_i + \delta_t + \gamma_p + X'_{ipt} + \varepsilon_{ipt} \quad (1)$$

where Y_{ipt} is one of the following outcomes: (1) employed (1 or 0); (2) retired (1 or 0); (3) $\ln(\text{monthly earnings})$ (4) work in private sectors (1 or 0). Monthly earnings include regular wage, bonus and all subsidies from current primary job. The price is deflated at the 2014 level. X'_{ipt} is a vector of individual characteristics controls, which include: age, age squared, years of schooling, and ethnicity. δ_t is year fixed effects. γ_p is prefecture fixed effects. Standard error is clustered at the prefecture level. I restrict my analysis to those individuals who report they currently have a full time job if outcome is $\ln(\text{monthly earnings})$ or working in private sectors I run Equation 1 for before (1988 and 1995) and after (2002 and 2007) periods, separately.

Table 5 presents the results in four panels and two columns. Each panel represents one outcome in two columns, separately. Column (1) shows gender gap in the labor market before the reform while column (2) indicates gender gap in the labor market after the reform. The results suggest the gender gap in all interested outcomes significantly increases in the post-reform period. For example, panel A indicates that females are 5.6 percentage points less likely to be employed than males before the reform and 15.2 percentage points less likely to be employed than males after the reform. The gender gap in employment significantly increases. More females than males leave the labor market after the reform. Results in panel B suggests that some females leave the labor market in the form of early retirement. Females are 11.4 percentage points more likely to retire early than males in the post-reform period. As I have discussed before, many firms use early retirement to force workers to leave the job position during the labor market restructuring process. The results suggest that firms are more likely to employ this method on females. Panel C shows that gender monthly earnings gap increases from 12.1% to 22.5% even after partialling out the effect of education, age, ethnicity,

unobserved time-invariant prefectural characteristics and time trend. For each one dollar a working men earn, a working woman can only earn less than 80 cents in the post-reform period. Panel D reflects the dramatic change of the labor market structure. In the central planning system, very few (2%) people worked in the private sectors and there is no difference between men and women working in different ownerships firms. However, after the SOE reform, 49% of men and 57% of women work in the private sectors. Moreover, women are 7.1 percentage points more likely to sort into private sectors, which offer less pay and worse welfare benefit than state-owned sectors during that time period (Meng, 2000).

While the results in Table 5 indicates gender gaps in labor market outcomes have increased, they are not necessarily caused by the SOE reform. There could be many different reasons contributing to this pattern. For example, increased household income, working in different industries or/and occupations. Some other major events which happened between 2002 and 2007 could also result in the increased gender gaps. For instance, trade liberalization or massive internal migration. But the SOE reform is one of the most important market reforms during that time period. To investigate the casual impact of this reform on gender inequality and the underlying mechanisms of the increased gender gap in the labor market, I next employ both difference-in-differences (DID) and instrumental variable (IV) strategies to investigate whether and how men and women are affected differently in the labor market restructuring process.

5.2 Main Strategy

I first present the DID specification and then discuss the IV strategy. These two methods should be considered as complements to each other because each has its own advantages and caveats.

5.2.1 Difference-in-Differences Strategy

My first main strategy is the DID method. I exploit two sources variations, geographical intensity variation and the time of SOE reform officially implemented. I use the change of SOE employment share to measure the reform intensity. Because my objective is to study whether women are affected differently, I estimate a generalized DID model, as follows:

For individual i in prefecture p in year t ,

$$Y_{ipt} = \alpha + \beta_1 Female_i * After_t * \Delta EmpShare_p + \beta_2 Female_i * After_t + \beta_3 Female + \beta_4 Female_i * \Delta EmpShare_p + \beta_5 \Delta EmpShare_p * After_t + \delta_t + \gamma_p + X'_{ipt} + \varepsilon_{ipt} \quad (2)$$

Where Y_{ipt} is one of the three outcomes: (1) employed (1 or 0); (2) retired (1 or 0); or (3) $\ln(\text{real monthly earnings})$. $\Delta EmpShare_p$ is calculated by using the formula presented in section 4.2. $Female$ and $After$ are two dummy variables. X'_{ipt} is a vector of individual characteristics, including age, age squared, years of schooling, and ethnicity. δ_t is year fixed effects. γ_p is prefecture fixed effects. Standard errors are clustered at the prefecture level. $\Delta EmpShare_p$ has been standardized to have mean equal to zero and standard deviation equal to one to facilitate interpretation.¹⁹

β_1 is the main coefficient of interest. It describes the additional effect. In other words, a statistically significant β_1 suggests that the greater the exposure to the SOE reform, the larger the effect on females. Essentially, it captures whether the gender gap would change because of greater exposure to the privatization movement. Besides, β_2 indicates the overall increased gender gap after the reform, and β_3 shows the gender gap before the reform. β_5 is another worth noting coefficient since it captures the effect of the SOE reform on males.

One important underlying assumption to validate the DID strategy is that those more affected areas would have had the same trend in the gender gap as less affected areas had there been no SOE reform. In section 7.2, I will provide supporting evidence for this assumption. Another major concern of this strategy is that the change of SOE employment share may be correlated with some unobserved prefectural changes that may affect the outcome variables. For example, some private firms may be more likely to enter into places where male workers are more productive, which affects the measurement of privatization intensity and the interested gender gap outcomes. Hence, the OLS estimation tends to produce biased results. In the next section, I provide the IV strategy to overcome such concerns.

¹⁹2007 wave did not ask the question about communist party membership, I include this as another control as robustness check in appendix, the results do not change; Also, I try to define employed as both full employed and self-employed in appendix, the results do not change either. Among individuals who are employed, 2.7% are self-employed. Furthermore, only two waves (1995 and 2002) ask weekly working hours, I add this another control to study the effect on earnings in appendix, the results do not change.

5.2.2 Instrument Variable Strategy

I develop a Bartik intensity index by using the pre-reform prefectural industrial employment composition and national industry-specific shock to the SOE employment to instrument the change of SOE employment share. In this setting, Bartik intensity index works as a negative labor demand shift.

The IV equation takes the form of the equation represented in Equation 2 above, but the variable of interest is replaced by predicted change of SOE employment share:

$$Y_{ipt} = \alpha + \beta_1 Female_i * After_t * \Delta EmpShare_p + \beta_2 Female_i * After_t + \beta_3 Female + \beta_4 Female_i * \Delta EmpShare_p + \beta_5 \Delta EmpShare_p * After_t + \delta_t + \gamma_p + X'_{ipt} + \varepsilon_{ipt} \quad (3)$$

The predicted value of $\Delta EmpShare_p$ is generated by the first stage specified as follows:

$$\Delta EmpShare_p = \pi + \pi_1 BartikIntensity_p + \delta_t + X'_{ipt} + \varepsilon_{ipt} \quad (4)$$

All other elements in these equations are the same as in Equation 2. For this IV approach to be valid, the instrument needs to satisfy the exclusion restriction such that, conditional on the controls in the models, subsequent trends in the gender gap in interested outcomes would not be correlated with the change of SOE employment share except for a direct effect of the Bartik intensity index. I also need the Bartik intensity index to be a strong predictor of the change of SOE employment share. Figure 4 shows a simplified bivariate version of the first stage relationship in the IV approach. It presents a simple scatter plot depicting the relationship between Bartik intensity index and change of SOE employment share. The pattern is clearly linear, demonstrating that this monotonicity requirement holds. A bivariate regression between these two variables yields a t- statistic of around 4. Given the strength of these relationships, it is not surprising that the data exhibit sufficient power in our first stage regression; the F-statistic on the instrument is 12.15.

6 Results

6.1 Main Results

6.1.1 Difference-in-Differences Results

The baseline results of OLS analysis are presented in Table 6. Columns (1) to (3) provide full sample estimates while columns (4) to (6) show the subsample results as described by Equation 2. I find similar results by studying different samples. Overall, I find that SOE reform is associated with women being less likely to be employed, more likely to retire early and the gender earnings gap increases.

Specifically, β_2 across first three columns suggest that gender gaps increase by 10.5 percentage points and 5.9 percentage points in employment and retirement, respectively, during the post-reform period. Also, gender monthly earnings gap increases 11.8% after the reform. The results are similar by using the subsample. The fact that gender gaps increase could be resulted from the improvement of males' labor market outcomes, or deterioration of females' labor market outcomes, or both. The insignificant β_5 across all six columns suggests that males are not affected by the SOE reform. In contrast, the statistically significant β_1 across six columns suggests that women are disproportionately negatively affected by the reform. In other words, the greater exposure to the SOE reform, the larger the effect on women. β_1 in column (1) indicates that a one standard deviation increase in the reform intensity (19% increase in the change of SOE employment share) is associated with a decrease in the likelihood of being employed by 1.4 percentage points. The effect is larger by using subsample, which is shown in column (4). A simple back-to-the-envelope calculation suggests that the SOE reform can explain 13% - 24.5% increase in employment gender gap. Similarly, column (2) and column (5) indicates that the SOE reform can explain 23.7% - 31.6% increase in retirement gender gap. And column (3) and column (6) shows that the SOE reform can explain 33% - 36.4% increase in monthly earnings gender gap.

I present these results by controlling for a series of individual characteristics, prefectural fixed effects, time fixed effects and prefectural specific time trends. So any time-invariant unobserved prefectural characteristics, common shocks to all prefectures and prefectural specific time shocks that could affect the outcomes are all considered. These results suggest that women are more likely

to leave the labor market than men and some of them leave in the form of early retirement in the labor market restructuring process. Moreover, for those who are working, women earn much less than men even if they have the same pre-market individual characteristics as men.

6.1.2 IV Results

As I discussed before, DID estimation may suffer from endogeneity issue since change of SOE employment share may be correlated with some unobservable prefectural characteristics which could affect the interested outcomes. Therefore, I use IV strategy to address this concern. Table 7 shows the IV results by Equation 3.

First, column (1) suggests a strong first stage relationship between the change of SOE employment share and the Bartik intensity index. Second, by using the Bartik intensity index as an instrument, I find similar patterns in the increased gender gaps in employment, retirement and monthly earnings as the DID estimation. The magnitude is larger than DID estimation, which suggests DID may underestimate the effect of the SOE reform. One possible reason

Insignificant β_5 across column (2) to column (4) indicates that males are not affected in employment, retirement and monthly earnings by this reform. On the contrary, significant β_1 across these three columns suggest that females are substantially negatively affected by SOE reform. A one standard deviation (20%) increase in the reform intensity causes gender gap in employment to increase by 6.9 percentage points, in retirement to increase by 6.3 percentage points, and the gender monthly earnings gap increases by 8.4% due to this reform. The back-to-the-envelop calculation suggests that over 50% increased gender gaps can be explained by the SOE reform. This holds for all three outcomes: employment, retirement and monthly earnings.

To sum, I find that the SOE reform causes women to disproportionately leave the labor market and one way of leaving is through early retirement. Moreover, I find that the gender earnings gap increases due to this privatization movement. Both DID and IV estimation have their own strength and weakness. The DID estimation results may be more representative and have more power than IV estimation results because of the larger sample size, and IV estimation tends to be unbiased.

Next, I will discuss the heterogeneous effects by age. One possible reason that the effects may differ by age is that the relatively old cohort were assigned the job while the young cohort live in a newly emerging market economy. For those old working women, I would expect that their earnings

are not affected by this reform. But the effect on employment and retirement is ambiguous by age. It is possible that women are discriminated against men across all age groups in employment. On the other hand, old cohorts tend to be low skilled laid off workers, it is possible that old females are more likely to leave the labor market because of physical weakness or household demand (eg. taking care of grandchildren).

6.2 Heterogeneous Effects by Age Groups (Event Study)

In this section, I augment DID approach by implementing event-study methods designed to examine whether the age path of the estimated impact on gender gaps changes as a function of exposure to the SOE reform. The objective of this study is to explore some possible underlying explanations for my findings.

The augmented regression model takes the following form:

$$\begin{aligned}
Y_{igt} = & \alpha + \sum_{g=1}^{12} \beta_{1g} Female_i * After_t * \Delta EmpShare_p * g + \sum_{g=1}^{12} \beta_{2g} Female_i * After_t * g \\
& + \sum_{g=1}^{12} \beta_{3g} Female_i * \Delta EmpShare_p * g + \sum_{g=1}^{12} \beta_{4g} After_t * \Delta EmpShare_p * g + \tau_g \\
& + \delta_t + \gamma_p + X'_{ipt} + \varepsilon_{ipt} \quad (5)
\end{aligned}$$

where g represents 12 age categories between ages 19 and 54. The respective coefficients β_{1g} map out the age pattern in the gender gap in response to the SOE reform. τ_g is age fixed effects. All other variables in the equation are the same as in Equation 2.

I present the results as three panels in Figure 5. For each figure, the X-axis represents 12 age categories. Each point indicates the effect on a specific age group with 90% confidence intervals. In panel (a), I find the effect on employment is almost entirely driven by age between 43 and 54. This is a relatively old cohort. Panel (b) suggests increased in early retirement gender gap is driven by age between 49 and 54 group. Although both increased gender gaps in employment and retirement are driven by older cohort, panel (c) suggests that gender monthly earnings gap increases among relatively younger cohort. The SOE reform causes working young women (age between 34 and 42) to earn much less than young men.

Nonetheless, the fact that women have left the labor market and that the gender gap has increased do not necessarily suggest that women are worse off than before. For example, it could be an individual's rational and optional choice (substitution and income effects) to leave the labor market because of the increased household income. On the other hand, the increased gender earnings gap could result from specializing in different industries or occupations. Next, I will provide some evidence to argue that women's disproportionate retreat from the labor market is hardly driven by increased household income and that the sizable gender monthly earnings gap still exists even if I control for industries, occupations, and many other different potential explanatory variables .

To investigate possible explanations, I further present DID estimation results by adding more explanatory variables. Table 8 shows the effects of SOE reform on gender gaps in employment and retirement among old cohort ($\text{age} \geq 40$) by adding household income and the existence of a child under age 6 as another two controls. Higher household income may drive women to specialize in housework. Similarly, the existence of a child may cause women to go back home and take care of their children or grandchildren because of the increased childcare cost after the SOE reform. From column (1) to column (4), I first present the baseline results, and then add these two controls one by one. Column (4) shows the effect on gender gap in employment if I control for both of them. Overall, I find increased household income and childcare cost can explain very little increased gender gap in employment. The adjusted R-squared increases 3% from column (1) to column (4). I also find increased household income and childcare cost cannot explain the increased gender gap in early retirement, which is shown in column (5) to column (8).

Column (1) to column (6) in Table 9 show the impact of SOE reform on gender gap in monthly earnings among young cohort, adding working industries, occupations, the existence of a child under age 6, increased household income and ownerships as other controls. For working individuals, the sizable gender monthly earnings gap may result from sorting into different industries or occupations. For example, nurses and teachers are regarded as female-dominant occupations which pay less than male-dominant financial sectors. The existence of a child at home may cause women to be less productive at work, which may explain their lower monthly earnings than men. Moreover, private sectors tend to offer lower wages and less welfare benefits than state-owned sectors in China. Thus,

if women are more likely to sort into private sectors, their earnings could be lower.²⁰

However, I find all these factors can only contribute to a small part of the widening gender gap. From column (1) to column (6), the coefficient of β_1 decreases from -0.045 to -0.030, with adjusted R-squared increases from 0.6192 to 0.6987. A one standard deviation increase in the SOE reform intensity causes gender gap in monthly earnings to increase by 3.0%, after partialling out the effects of working industries, occupations, ownerships, increased household income and childcare cost. This suggests that the increased gender monthly earnings gap is driven by within ownership, industry and occupation variations.

6.3 Influence of Traditional Gender Norms

The current literature proposes three leading reasons to explain the persistent gender earnings gap in the labor market: gender differences in productivity and/or preferences, or labor market discrimination (Bertrand, 2011). I will provide some suggestive evidence on gender discrimination. It is hard to directly test the labor market discrimination hypothesis, either statistical or tasted-based, using survey data. However, the special feature about China is that it has a long history of gender discrimination culture, which is shown by the extremely unbalanced sex ratio at birth (Qian, 2008). Many existing literature has discussed the unique feature of extreme child sex ratios in China, South Korea, and Northwest India. Some studies argue that the patrilineal culture interlaying with the pre-modern political and administrative systems shapes the rigid son preferences (Das Gupta, 2009; Gupta, 2005). Also, there are studies suggesting that the regional variation of contemporary gender norms can be traced back to some historical factors. For example, Alesina et al. (2013) find that regions which traditionally practice plough agriculture have less equal gender norms. A similar research suggests that textile cotton production is negatively associated with the male-to-female sex ratio today in China (Xue, 2015).

I take advantage of the fact that the son preference culture might vary across regions, and that, as a result, sex ratio at birth might be different in different places (Jayachandran, 2015). In other words, sex ratio at birth could be used as a signal to proxy the traditional gender norms. Since I do not have access to birth registry, I use 1990 census data to calculate the sex ratio for those age under 10 cohorts to proxy for existing gender norms and divide prefectures into high and low sex

²⁰As an extra analysis, I do find working women are 2.4 percentage points more likely to sort into private sectors.

ratio areas and I study whether women are affected differently in these two areas. It is crucial to use pre-reform data because it will rule out the possibility that the variation of sex ratio is driven by the SOE reform.

Table 10 show the DID and IV estimation results. First and foremost, I find that effects are almost entirely driven by the high sex ratio areas. β_1 in column (2) and (4) suggest that women earn much less than men in the areas where there is a high sex ratio at birth. For example, column (2) indicates that One standard deviation (20%) increase in the SOE reform intensity is associated with an increase of 12% in gender earnings gap in the high sex ratio areas, while negative but insignificant effect is detected in the low sex ratio areas. IV estimation suggests the similar results, while the magnitude is bigger.²¹ This suggests traditional gender norms play an important role in the determination of labor market outcomes when the enforced gender equality regulation was lifted.

7 Threat to Identification

I have presented robust results on gender gaps by controlling for a series of individual characteristics, and labor market characteristics in previous section. In this section, I first further discuss some other possible confounding events which happened between 1988 and 2007. Then, I will present two pieces of evidence to support the parallel trend assumption.

7.1 Access to WTO and Migration

One possible confounding event is China's entry to the WTO in 2001. Starting from 2002, trade liberalization not only attracts a large number of foreign companies entering into Chinese market but also results in a dramatic increase of export-driven private firms. However, my measurement of intensity of SOE reform does not capture the effect of trade liberalization because I restrict my calculation of change of employment share to the time period before 2002.

Another potential confounding factor is migration. From 1990 to 2000, more and more indi-

²¹One concern in using sex ratio to proxy gender discrimination is that the variation of sex ratio by regions may be driven by the availability of prenatal sex selection technology. However, the ultrasound machine was first introduced to China in the early 1980s and when it came to 1987, every county had been equipped with six machines, on average (Almond et al., 2010; Chen et al., 2013). And even if the sex ratio is driven by such supply side factor, it can still be a result of different tastes for boys and girls.

viduals from the rural areas of west part of China migrated to the east to work. But they were not entitled to enjoy any benefits or rights which belonged to urban residents. For example, it was almost impossible for them to work in the SOE. Furthermore, they tend to do part-time jobs, jobs without any contract and they are usually not officially registered. In this paper, my definition of urban workers does not include any workers who are not officially registered, as a result, the existence of migrant workers will not affect my measurement of privatization intensity. To the extent which there may be any measurement error in the data collection process, I drop those prefectures which most migrant workers would go during that time period and present my results in Table A.4 in Appendix. I find similar results as before.²² Due to this reform, women are negatively affected in employment and monthly earnings. Also, women are more likely to retire early.

7.2 Falsification Test

The primary concern of using the difference-in-differences strategy is the failure of satisfying the parallel trend assumption, so I conduct a pseudo policy evaluation experiment and present the results in Table 11. The idea is to assume the SOE reform happened some time between 1988 and 1995. Hence, I should not find any effects by studying this pseudo SOE reform. The null results from Table 11 confirm this assumption and this experiment provides first evidence to support the validity of using DID in the true SOE reform.

As another placebo test, I conduct a permutation test in which I randomly permute treatment variables within the sample. For each permutation, the timing of the SOE reform and the intensity are randomly chosen. Individuals' exposure to different treatment variables are then assigned accordingly.²³ Figure ?? displays the empirical distributions of the placebo treatment effects on three outcome variables from 1,000 permutation tests. The fact that the distribution is centered at zero is comforting as these placebo tests are expected to find no impacts. In panel A, when I compare the treatment effects that are based on actual exposure, the results indicate that less than 1% of the time permutation estimates are larger than the estimates of actual treatment. In panel B and panel C, the results suggest that none of the 1,000 times of permutation estimates are larger

²²Most of these migrant workers were working in one particular province during that time period, which is *Guangdong*.

²³Recently, permutation tests have been used in the following papers: (Agarwal et al., 2013), (Bloom et al., 2012) and (Chetty et al., 2010)

than the estimates of actual treatment. This result based on permutation tests reassures that the effect of SOE reform is statistically significant.

8 Conclusions

One of the most noticeable achievements in the past several decades in our society is the promotion of gender equality in almost every aspect of human activities. Recently, researchers have shifted the focus to understand the persistent sizable gender gap in politics, high earnings and high-status occupations. Many developed countries have implemented various policies to enforce gender equality in some specific occupations; however, current research does not find consistent significant, positive effects from these policies on narrowing gender gaps. This paper mainly contributes to this area and I study a unique historical period in China between 1950 and the 1990s in which the central government had been cultivating in citizens the gender equality ideology, setting up laws to ensure gender equality in rights and, more importantly, implementing the central planning labor arrangement to guarantee an extremely high female labor force participation rate and low gender earnings gap.

Has this period of more than over 40 years of strict government intervention changed people's attitudes toward the appropriate roles between men and women in the society? My research suggests that the answer is No. I employ both difference-in-differences and instrumental variable strategies to study the causal effects of SOE reform or so called privatization movement that took place in the late 1990s on gender inequality in the labor market. My DID and IV strategies produce the similar results. These two methods should be considered as complements to each other since DID estimates may have more power by using a larger sample while IV estimates tend to generate unbiased results. I find the privatization movement leads to a significant increase in the gender gaps in the labor market. The SOE reform negatively and disproportionately affects women. The greater exposure to the SOE reform, the larger the effect is. Both my DID and IV estimation results suggest that the increased gender gap is hardly because of the increased household income nor because of women being less productive. On the other hand, I use geographic variation in sex ratio to proxy historical gender norms and my results suggest that even labor market liberalization cannot eliminate the influence of traditional gender norms.

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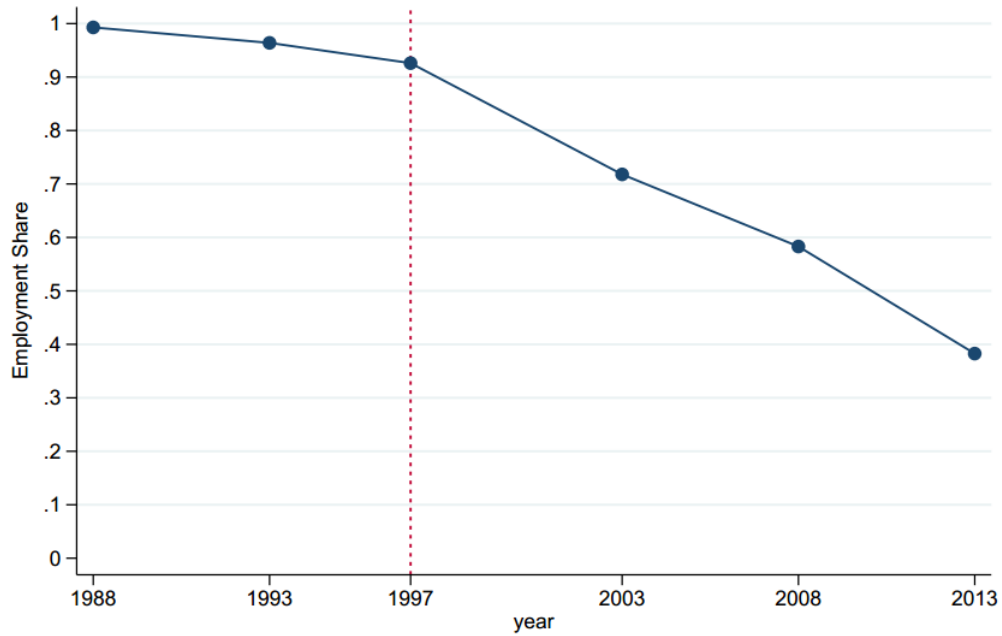
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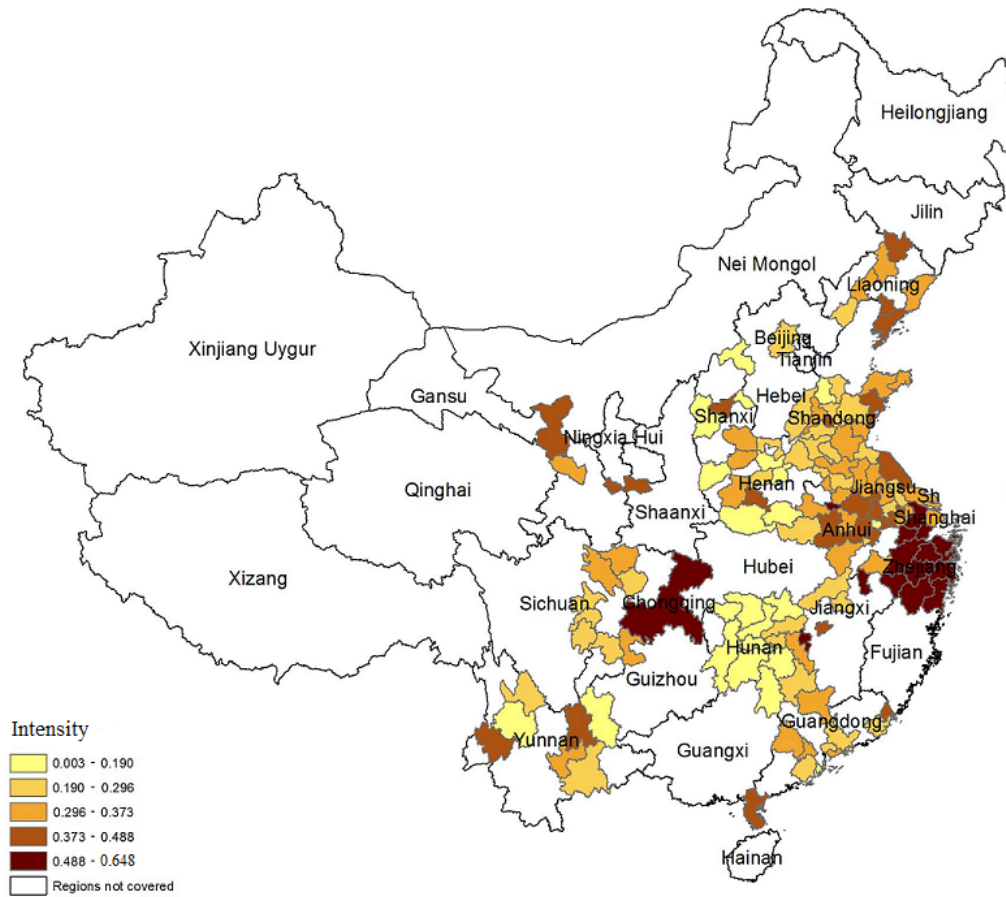
9 Figures and Tables

Figure 1: Share of urban labor force working in SOE



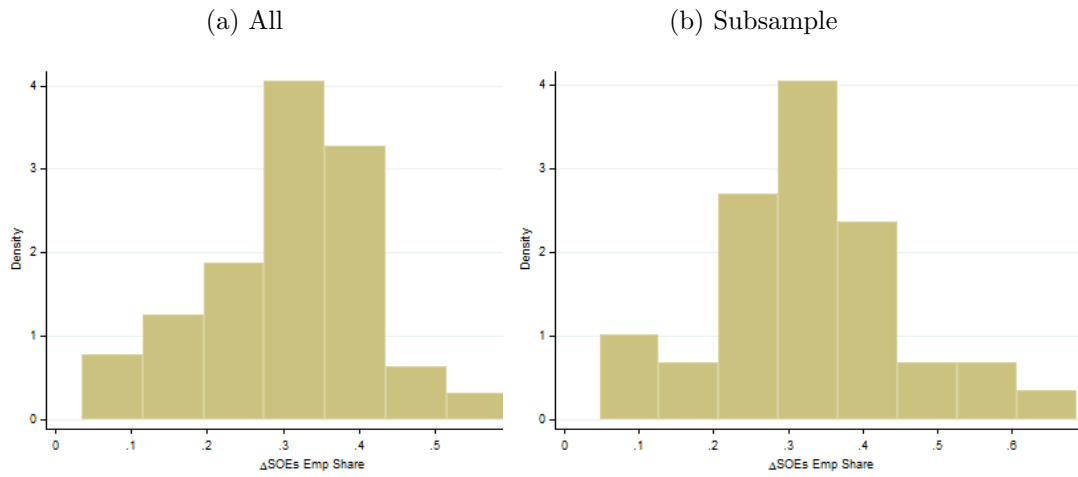
Notes: Data comes from Comprehensive Statistical Data and Materials on 50 Years of New China. China Statistic Yearbook 2004, 2009, 2014. SOE (State-Owned Enterprises) include central SOE, local SOE, and collective-owned firms in urban areas.

Figure 2: Regional variation in change of SOE employment share



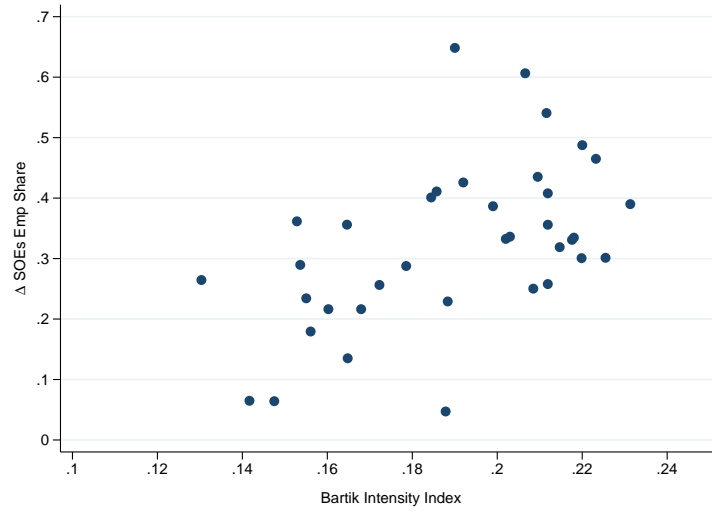
Notes: Δ SOE Emp share = (number of workers in SOE₁₉₉₅/total number of workers in a given urban prefecture area₁₉₉₅) - (number of workers in SOE₂₀₀₁/total number of workers in a given urban prefecture area₂₀₀₁). SOE include central SOE, local SOE and collective-owned firms in the urban areas. Data comes from China Provincial Statistical Yearbook and China Labor Statistical Yearbook 1996, 2002. White color refers to the regions which are not covered by the CHIP survey or no data available.

Figure 3: Change of SOE employment share



Notes: Bin width: 0.08. (a) Sample includes all 80 prefectures. The mean is 0.31 with standard deviation 0.12. (b) Sample includes 37 prefectures with pre-reform number of SOE workers by industry. The mean is 0.33 with standard deviation 0.13. Δ SOE Emp share = (number of workers in SOE₁₉₉₅/ total number of workers in a given urban prefecture area₁₉₉₅) - (number of workers in SOE₂₀₀₁/total number of workers in a given urban prefecture area₂₀₀₁). SOE include central SOE, local SOE and collective-owned firms in the urban areas. Data comes from China Provincial Statistical Yearbook and China Labor Statistical Yearbook 1996, 2002.

Figure 4: Relationship between Bartik shift-share intensity index and change of SOE employment share



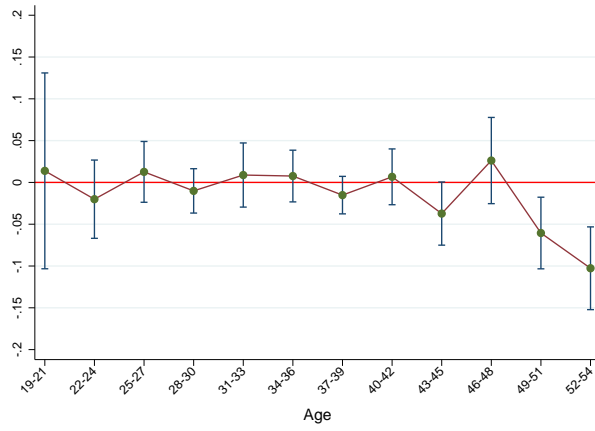
Notes: Data comes from China Provincial Statistical Yearbook, China Labor Statistical Yearbook, China

Statistical Yearbook 1996, 2002. Bartik Intensity Index_p = $(\sum_{i=1}^n \text{pre-reform share of SOE workers in industry } i \text{ at prefecture } p * \Delta \text{ SOE employment share in industry } i \text{ at the national level})$.

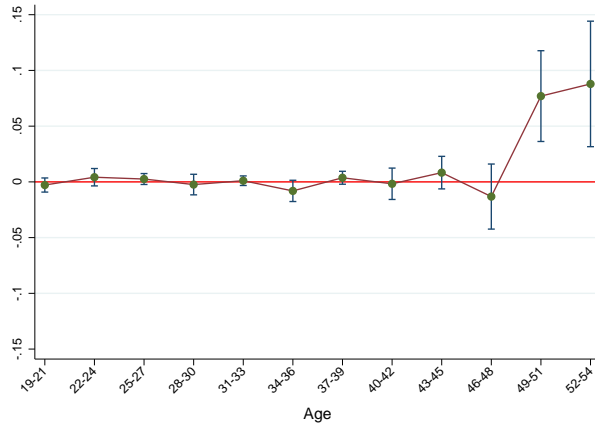
pre-reform share of SOE workers in industry i at prefecture p = (number of SOE workers in industry i at prefecture p / number of workers at prefecture p). Δ SOE employment share in industry i at the national level = ((national number of SOE workers in industry i₁₉₉₅ / national number of workers in industry i₁₉₉₅) - (national number of SOE workers in industry i₂₀₀₁ / national number of workers in industry i₂₀₀₁)). Δ SOE Emp share = (number of workers in SOE₁₉₉₅ / total number of workers in a given urban prefecture area₁₉₉₅) - (number of workers in SOE₂₀₀₁ / total number of workers in a given urban prefecture area₂₀₀₁).

Figure 5: DID estimate coefficients of the impacts of SOE reform

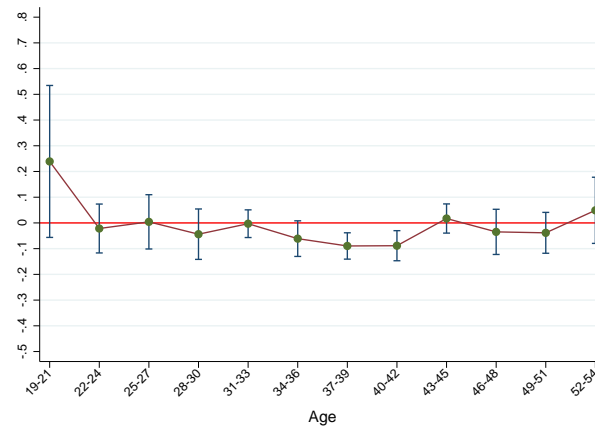
(a) Employment



(b) Retirement



(c) Monthly Earnings



Notes: Regression estimates by Equation 5 are plotted. The dot and the bar correspond to the coefficient estimates with 90% confidence intervals.

Figure 6: Permutation test results, coefficient of (female*after* Δ SOE emp share β_1)



Notes: I assigned placebo treatment in randomly selected year and prefectures drawn without replacement. The histogram displays the coefficient estimates of a triple interaction term: female, after and Δ SOE Emp share from 1,000 permutations. The vertical line shows the estimates of the actual treatment effect. Female and after are two dummy variables. Δ SOE Emp share = (number of workers in SOE₁₉₉₅/total number of workers in a given urban prefecture area₁₉₉₅) - (number of workers in SOE₂₀₀₁/total number of workers in a given urban prefecture area₂₀₀₁). Panel A shows that 1 out of 1,000 permutation estimates (absolute value) is greater than that of actual treatment. Panel B and panel C show that 0 out of 1,000 permutation estimates (absolute value) is greater than that of actual treatment.

Table 1: Summary Statistics of Key Variables: 1988 - 2007

	Before (1988 and 1995)	After (2002 and 2007)
<i>Panel A: selected labor market outcomes</i>		
Monthly earnings (RMB, in year 2014)	587.29 (359.72)	1823.22 (2080.53)
Currently employed	0.91 (0.28)	0.71 (0.46)
Retired	0.04 (0.19)	0.09 (0.29)
Work in private sectors	0.03 (0.17)	0.53 (0.50)
<i>Panel B: individual characteristics</i>		
Female	0.51 (0.50)	0.51 (0.50)
Age	36.76 (9.74)	38.93 (9.89)
Minority	0.04 (0.20)	0.03 (0.17)
Years of schooling	9.92 (2.92)	11.39 (3.25)
Communist party membership	0.21 (0.41)	0.24 (0.43)
Observations	31235	21135

Note: Unweighted means and standard deviations are presented. Standard deviations in parentheses. Individuals between age 19 and 54.

Table 2: Prefectural pre-reform share of SOE workers, by industry

Industry	Mean	St.Dev.	Min	Max
Mining	0.018	0.026	0.001	0.117
Manufacturing	0.418	0.086	0.233	0.542
Electricity, Gas and Water Production and Supply	0.015	0.006	0.008	0.032
Construction	0.057	0.025	0.031	0.135
Transport, Storage and Communications	0.050	0.018	0.021	0.116
Wholesale and Retail Trade, Restaurants	0.133	0.032	0.065	0.209
Financial Intermediation and Insurance	0.018	0.005	0.006	0.209
Real Estate Activities	0.006	0.005	0.001	0.029
Social Services	0.032	0.020	0.010	0.099
Scientific Research and Polytechnical Services	0.014	0.016	0.002	0.073

Notes: N = 37. Data comes from Provincial Statistical Yearbook 1996, 1995. Pre-reform share of SOE workers = (number of SOE workers in industry i at a given prefecture p_{1995} / total number of workers in prefecture area p_{1995}) in the urban areas.

Table 3: National change of SOE employment share, by industry

Industry	Δ SOE Employment Share
Mining	0.202
Manufacturing	0.334
Electricity, Gas and Water Production and Supply	0.126
Construction	0.190
Geological Prospecting and Water Conservancy	0.004
Transport, Storage and Communications	0.089
Wholesale and Retail Trade, Restaurants	0.170
Financial Intermediation and Insurance	0.096
Real Estate Activities	0.211
Social Services	0.122
Scientific Research and Polytechnical Services	0.070

Notes: Data comes from China Statistical Yearbook 1996, 2002. Δ SOE emp share at the national level = (national number of SOE workers in industry i_{1995} / total number of workers in industry i_{1995}) - (national number of SOE workers in industry i_{2001} / total number of workers in industry i_{2001}).

Table 4: Change of SOE employment share and Bartik shift-share intensity index

	Δ SOE Emp Share _p		Bartik Intensity Index _p
	All	Subsample	Subsample
Mean	0.31	0.33	0.19
St.Dev.	0.12	0.13	0.03
Min	0.04	0.05	0.13
Max	0.65	0.65	0.23
Number of prefectures	80	37	37

Notes: Author's calculation. Data comes from China Provincial Statistical Yearbook, China Labor Statistical Yearbook, China Statistical Yearbook 1996, 2002

Table 5: Gender gaps in the labor market

	Before 1988 and 1995	After 2002 and 2007
<i>Panel A: Employed</i>		
Female	-.056*** (.004)	-.152*** (.009)
Male mean	0.96	0.83
Female mean	0.89	0.65
Obs.	29693	20709
<i>Panel B: Retired</i>		
Female	.047*** (.003)	.114*** (.008)
Male mean	0.01	0.03
Female mean	0.06	0.15
Obs.	29813	20709
<i>Panel C: ln(Monthly earnings)</i>		
Female	-.121*** (.009)	-.225*** (.015)
Male mean	634.17	2113.47
Female mean	539.45	1513.63
Obs.	26483	14508
<i>Panel D: Work in private sectors</i>		
Female	.002 (.002)	.071*** (.009)
Male mean	0.02	0.49
Female mean	0.02	0.57
Obs.	28093	14407

Notes: Sample includes all individuals between age 19 and 54. Monthly earnings are deflated at the 2014 price level. Robust standard errors are clustered at the prefecture level. Regression controls for age, age squared, years of schooling, ethnicity, prefecture and year dummies. Panel C include those individuals who report they currently have a full time job. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 6: DID estimates of the impacts of SOE reform

Dependent variable	All			Subsample		
	Employed	Retired	ln(Monthly earnings)	Employed	Retired	ln(Monthly earnings)
Mean	0.83	0.06	RMB1068.25	0.82	0.07	RMB1294.63
St.dev.	0.38	0.24	RMB1458.28	0.39	0.25	RMB1752.63
	(1)	(2)	(3)	(4)	(5)	(6)
Female*after* Δ emp share, β_1	-0.14** (.007)	.014*** (.004)	-.039** (.016)	-.024** (.012)	.018** (.008)	-.048*** (.014)
Female*after, β_2	-.105*** (.009)	.059*** (.008)	-.118*** (.014)	-.098*** (.014)	.057*** (.012)	-.132*** (.019)
Female, β_3	-.054*** (.004)	.052*** (.003)	-.123*** (.010)	-.049*** (.005)	.059*** (.004)	-.099*** (.013)
Female* Δ emp share, β_4	.015*** (.005)	-.003 (.004)	.002 (.019)	.010 (.007)	-.003 (.006)	-.008 (.012)
After* Δ emp share, β_5	.002 (.010)	-.009 (.008)	-.017 (.025)	.005 (.016)	-.013 (.008)	.034 (.054)
Obs.	47522	47647	37829	25450	25494	19427
Number of prefectures	80			37		

Notes: Individuals between age 19 and 54. Monthly earnings are deflated at the 2014 year level. column(3) and column (6) include individuals who report they currently have a full time job. Subsample includes those 37 prefectures with pre-reform number of SOE workers by industry. All models include age, age squared, years of schooling, ethnic minority, prefecture fixed effects, year fixed effects and prefecture specific time trend. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 7: 2sls estimates of the impacts of SOE reform (subsample)

Dependent Variable	First stage		IV			
	Δ emp share		Employed	Retired	ln(Monthly earnings)	
Mean	0.33		0.82	0.07	RMB1294.63	
St.Dev.	0.13		0.39	0.25	RMB1752.63	
	(1)	(2)	(3)	(4)		
Bartik intensity	0.400***					
	(0.122)					
Female*after* Δ emp share, β_1			-0.069**	0.063**	-0.084*	
			(0.028)	(0.028)	(0.044)	
Female*after, β_2			-0.082***	0.042***	-0.117***	
			(0.016)	(0.014)	(0.019)	
Female, β_3			-0.050***	0.059***	-0.103***	
			(0.005)	(0.004)	(0.011)	
Female* Δ emp share, β_4			0.011	-0.008	0.014	
			(0.013)	(0.012)	(0.033)	
After* Δ emp share, β_5			-0.038	-0.016	-0.016	
			(0.039)	(0.024)	(0.093)	
F-statistics	12.15					
p-value	0.00					
Obs.	25502		25450	25494	19427	

Notes: Individuals between age 19 and 54. Monthly earnings are deflated at the 2014 year price level. column(4) include individuals who report they currently have a full time job. Subsample includes those 37 prefectures with pre-reform number of SOE workers by industry. column (2) to column (4) include age, age squared, years of schooling, ethnic minority, prefecture fixed effects, year fixed effects and prefecture specific time trend. Column (1) include age, age squared, years of schooling, ethnic minority, year fixed effects. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. Bartik intensity has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 8: DID Estimates of the impacts of SOE reform on employment and retirement (old cohort, age ≥ 40), additional controls

Dependent variable	Employed			Retired				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female*after* Δ emp share, β_1	-0.036** (.014)	-0.034** (.014)	-0.035** (.014)	-0.034** (.014)	.030*** (.008)	.029*** (.008)	.030*** (.008)	.029*** (.008)
Female*after, β_2	-.123*** (.015)	-.119*** (.015)	-.123*** (.015)	-.120*** (.015)	.092*** (.013)	.090*** (.013)	.092*** (.013)	.090*** (.013)
Female, β_3	-.130*** (.006)	-.131*** (.006)	-.130*** (.006)	-.131*** (.006)	.120*** (.006)	.120*** (.006)	.120*** (.006)	.120*** (.006)
Household income		Yes		Yes		Yes		Yes
Child under age 6			Yes	Yes			Yes	Yes
Adj. R-squared	0.2663	0.2724	0.2671	0.2734	0.2540	0.2583	0.2541	0.2586
Obs.	22069	22062	22069	22062	22126	22119	22126	22119

Notes: Individuals between age 40 and 54. All models include age, age squared, years of schooling, ethnic minority, prefecture fixed effects, year fixed effects and prefecture specific time trend. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 9: DID estimates of the impact of SOE reform on monthly earnings (young cohort, age<=40), additional controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Female*after* Δ emp share, β_1	-0.046*** (.015)	-0.040*** (.015)	-0.044*** (.015)	-0.043*** (.017)	-0.038*** (.015)	-0.041** (.016)	-0.030** (.013)
Female*after, β_2	-0.122*** (.019)	-0.120*** (.018)	-0.108*** (.019)	-0.047** (.023)	-0.068*** (.018)	-0.076*** (.023)	-0.138*** (.016)
Female, β_3	-0.093*** (.010)	-0.089*** (.010)	-0.088*** (.011)	-0.118*** (.012)	-0.123*** (.011)	-0.114*** (.011)	-0.091*** (.010)
Industry		Yes					Yes
Occupation			Yes				Yes
Child under age 6				Yes			Yes
Household income					Yes		Yes
Work in private sectors						Yes	Yes
Adj. R-squared	0.6192	0.6292	0.6303	0.6130	0.6756	0.6950	0.6987
Obs.	22603	22338	22351	22603	22601	22141	21802

Notes: monthly earnings are deflated at the 2014 price level. Samples include individuals who report that they currently have a full time job. All models include age, age squared, years of schooling, ethnic minority, year fixed effects, prefecture fixed effects, and prefectural specific time trend. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 10: Estimates of the impact of SOE reform on monthly earnings, by intensity of male-to-female sex ratio

	DID				IV
	Low(0.99-1.07) (1)	High(1.08-1.26) (2)	Low(0.99-1.07) (3)	High(1.08-1.26) (4)	
Female*after* Δ emp share, β_1	-0.007 (.018)	-0.067*** (.013)	-0.003 (.105)	-0.126** (.059)	
Female*after, β_2	-0.093*** (.018)	-0.111*** (.018)	-0.136*** (.030)	-0.102*** (.027)	
Female, β_3	-0.127*** (.014)	-0.117*** (.011)	-0.079*** (.012)	-0.116*** (.015)	
Obs.	19881	16918	8422	10761	

Notes: Dependent variable is $\ln(\text{monthly earnings})$. Individuals between age 19 and 54 who report they currently have a full time job. First two columns include full sample. Column (3) and column (4) include 37 prefectures with pre-reform industry employment composition. Monthly earnings are deflated at the 1988 price level. Low refers to low male/female sex ratio at birth; High refers to high male-to-female sex ratio at birth. All models include age, age squared, years of schooling, ethnic minority, working industries, year fixed effects, prefecture fixed effects and prefecture specific time trend. Sex ratio at birth is calculated by using census1990, I restrict to those individuals who are under age 10. The mean of sex ratio at birth is 1.09 with standard deviation 0.06. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. Bartik intensity has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 11: Placebo test: 1988 and 1995

Dependent Variable	Employed (1)	Retired (2)	ln(Monthly earnings) (3)
pseuFemale*after* Δ emp share, β_1	-.006 (.008)	.001 (.007)	-.013 (.022)
pseuFemale*after, β_2	-.015* (.008)	.006 (.005)	-.035** (.016)
Female, β_3	-.050*** (.004)	.045*** (.003)	-.113*** (.011)
Female* Δ emp share	.018*** (.005)	-.004 (.004)	.004 (.022)
pseuAfter* Δ emp share	.001 (.006)	.003 (.004)	.021 (.031)
Obs.	27374	27499	24074

Notes: I assume the SOE reform happened some time between 1988 and 1995. Thus, 1995 would be pseudo-after year. Sample includes all individuals between age 19 and 54. Column (3) include those individuals who report they currently have a full time job. Monthly earnings are deflated at the 2014 price level. Robust standard errors are clustered at the prefecture level. All models control for age, age squared, years of schooling, ethnicity, prefecture and year dummies. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

10 Appendix

Table A.1: Reduced form estimates of the impacts of SOE reform

	Employed (1)	Retired (2)	ln(Monthly earnings) (3)
Female*after*Bartik intensity(b1)	-.031*** (.011)	.029*** (.009)	-.038** (.019)
Female*after(b2)	-.105*** (.010)	.064*** (.009)	-.119*** (.018)
Female(b3)	-.049*** (.006)	.059*** (.004)	-.097*** (.011)
Female*Bartik intensity(b4)	.004 (.006)	-.003 (.005)	.010 (.011)
After*Bartik intensity(b5)	-.013 (.008)	.005 (.005)	.0004 (.037)
Obs.	25450	25494	19265

Notes: Sample includes all individuals between age 19 and 54. Monthly earnings are deflated at the 1988 price level. All regressions control for age, age squared, years of schooling, working experience, working experience squared, ethnicity, prefecture dummies, year dummies and prefecture specific time trend. Column(3) include individuals who report they currently have a full time job and also control for working industries. Bartik intensity has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table A.2: DID estimates of the impacts of SOE reform, by demographic group (full sample)

Dependent Variable	Age<=40		Age>40		
	Employed (1)	Retired (2)	ln(Monthly earnings) (3)	Retired (5)	ln(Monthly earnings) (6)
<i>Panel A: Pooled</i>					
Female*after* Δ emp share, β_1	-0.02 (.007)	.0007 (.001)	-.039*** (.015)	.029*** (.007)	-.019 (.027)
Female*after, β_2	-.058*** (.008)	-.0009 (.002)	-.122*** (.019)	.095*** (.013)	-.097*** (.024)
Female, β_3	.005 (.004)	.0009 (.0007)	-.089*** (.010)	.130*** (.007)	-.169*** (.015)
Obs.	27096	27166	22338	20481	15023
<i>Panel B: Edu< High School</i>					
Female*after* Δ emp share, β_1	-0.15 (.015)	-.0008 (.004)	-.061** (.024)	.035*** (.011)	-.037 (.035)
Female*after, β_2	-.076*** (.015)	-.0006 (.004)	-.158*** (.030)	.098*** (.017)	-.068** (.029)
Female, β_3	-.004 (.004)	.0006 (.0008)	-.107*** (.011)	.164*** (.010)	-.217*** (.022)
Obs.	15097	15161	12864	13443	9182
<i>Panel C: Edu>= High School</i>					
Female*after* Δ emp share, β_1	.003 (.008)	.001 (.002)	-.032* (.018)	.012 (.008)	.010 (.025)
Female*after, β_2	-.049*** (.011)	-.002 (.002)	-.115*** (.022)	.105*** (.010)	-.144*** (.031)
Female, β_3	.017** (.008)	.002 (.002)	-.059*** (.016)	.060*** (.009)	-.090*** (.010)
Obs.	11999	12005	9474	7038	5841

Notes: Individuals between age 19 and 54. Each model also includes age, age squared, years of schooling, ethnic minority, year fixed effects, prefecture fixed effects and prefecture specific time trend. Column (3) and column(6) include those individuals who report they currently have a full time job and also control for working industry. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

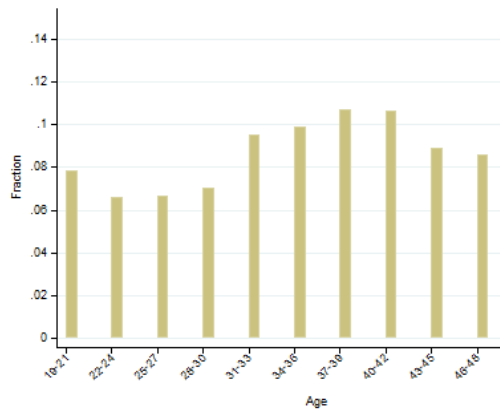
Table A.3: 2sls estimates of the impacts of SOE reform, by demographic group (Subsample)

Dependent Variable	Age<=40		Age>40		
	Employed (1)	Retired (2)	ln(Monthly earnings) (3)	Retired (5)	ln(Monthly earnings) (6)
<i>Panel A: Pooled</i>					
Female*after* Δ emp share, β_1	-0.13 (.030)	.001 (.004)	-201** (.101)	.119** (.050)	.009 (.075)
Female*after, β_2	-.052*** (.019)	-.003 (.003)	-.099** (.042)	.059** (.025)	-.135*** (.030)
Female, β_3	.015*** (.005)	.002*** (.0007)	-.076*** (.015)	.138*** (.010)	-.133*** (.017)
Obs.	13935	13954	11228	11540	8199
<i>Panel B: Edu< High School</i>					
Female*after* Δ emp share, β_1	.007 (.046)	.002 (.009)	-.308* (.168)	.145** (.064)	.010 (.084)
Female*after, β_2	-.091*** (.029)	-.002 (.004)	-.120* (.062)	.053 (.032)	-.094** (.045)
Female, β_3	.007 (.006)	.002** (.0008)	-.087*** (.015)	.179*** (.015)	-.164*** (.027)
Obs.	7154	7172	6109	7320	4798
<i>Panel C: Edu>= High School</i>					
Female*after* Δ emp share, β_1	-.027 (.028)	-.002 (.005)	-.198** (.095)	.057 (.039)	-.003 (.089)
Female*after, β_2	-.039* (.021)	-.004 (.003)	-.101** (.043)	.093*** (.018)	-.185*** (.029)
Female, β_3	-.008 (.013)	.003 (.004)	.113** (.048)	.002 (.025)	-.003 (.031)
Obs.	6781	6782	5119	4220	3401

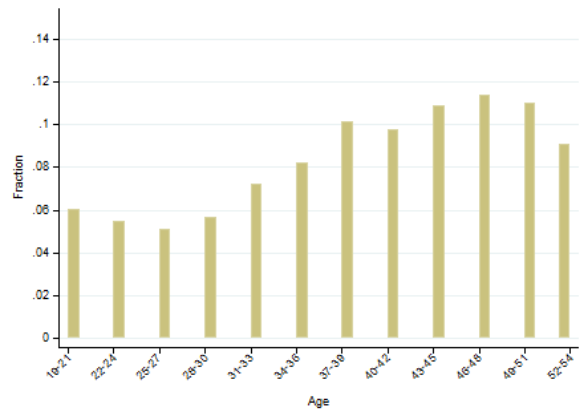
Notes: Individuals between age 19 and 54. Each model also includes age, age squared, years of schooling, working experience, working experience squared, ethnic minority, year fixed effects, prefecture fixed effects and prefecture specific time trend. Column (3) and column(6) include those individuals who report they currently have a full time job and also control for working industry. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. Bartik intensity has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

Figure A.1: Distribution of different age groups

(a) Before (1988 and 1995)



(b) After (2002 and 2007)



Notes: Bin width: 0.25. Data comes from CHIP 1988, 1995, 2002 and 2007.

Table A.4: Estimates of the impacts of SOE reform, drop Guangdong province

Dependent variable	DID			IV		
	Employed (1)	Retired (2)	ln(Monthly earnings) (3)	Employed (4)	Retired (5)	ln(Monthly earnings) (6)
Female*after* Δ emp share, β_1	-0.16** (.007)	.015*** (.004)	-.039** (.017)	-.063** (.027)	.061** (.026)	-.074* (.041)
Female*after, β_2	-.110*** (.010)	.064*** (.008)	-.116*** (.016)	-.082*** (.017)	.047*** (.015)	-.121*** (.018)
Female, β_3	-.054*** (.004)	.052*** (.003)	-.125*** (.011)	-.053*** (.005)	.061*** (.005)	-.101*** (.013)
Obs.	42098	42203	33367	22249	22288	16824

Notes: Individuals between age 19 and 54. Monthly earnings are deflated at the 2014 year level. column (3) include individuals who report they currently have a full time job. All models include age, age squared, years of schooling, ethnic minority, prefecture fixed effects, year fixed effects and prefecture specific time trend. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. Batik intensity has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table A.5: DID Estimates of the impacts of SOE reform (young cohort, age <=40)

Dependent variable	ln(Monthly earnings)		Work in private sectors
	(1)	(2)	(3)
Female*after* Δ emp share, β_1	-0.041** (.017)	-0.048* (.026)	.024*** (.006)
Female*after, β_2	-.121*** (.023)	-.088*** (.026)	.005 (.010)
Female, β_3	-.094*** (.016)	-.080*** (.010)	-.004* (.002)
Weekly working hours	Yes		
Communist party membership		Yes	
Obs.	12962	19502	21306

Notes: Individuals between age 19 and 40 who report they currently have a full time job. Monthly earnings are deflated at the 2014 year level. Column (1) include 1995 and 2002 waves because only these two waves ask the weekly working hours question. Column (2) include 1988, 1995 and 2002 waves because 2007 wave did not ask the communist party membership question. All models include age, age squared, years of schooling, ethnic minority, prefecture fixed effects, year fixed effects. Column (2) prefecture specific time trend. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

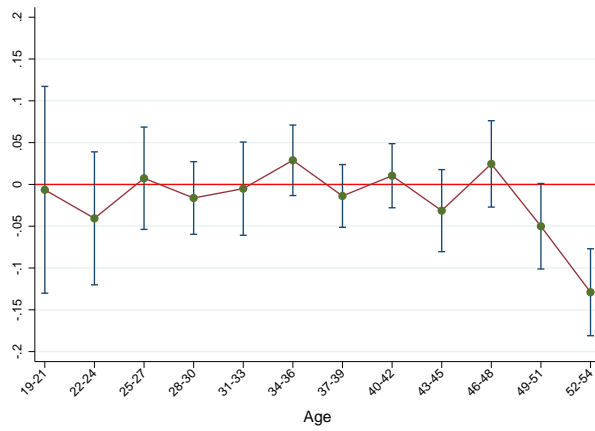
Table A.6: DID Estimates of the impacts of SOE reform (full sample), alternative definition of employment

Dependent variable	ln(Monthly earnings)	
	Employed (1)	(2)
Female*after* Δ emp share, β_1	-0.017** (.007)	-0.037** (.017)
Female*after, β_2	-0.115*** (.009)	-0.121*** (.014)
Female, β_3	-0.060*** (.003)	-0.122*** (.010)
Female* Δ emp share, β_4	.014*** (.005)	.004 (.020)
After* Δ emp share, β_5	.005 (.011)	-.011 (.027)
Obs.	47661	38754

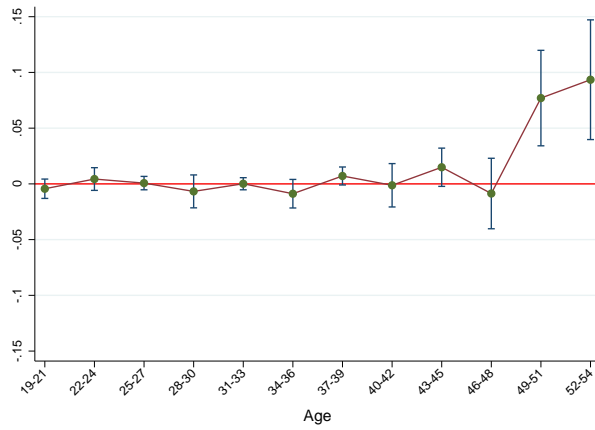
Notes: Individuals between age 19 and 54. Monthly earnings are deflated at the 2014 year level. Employed equals to 1 if individuals report they currently have a full time job or self-employed, and 0 otherwise. if column(2) include individuals who report they currently have a full time job or self-employed. All models include age, age squared, years of schooling, ethnic minority, prefecture fixed effects, year fixed effects. Column (2) prefecture specific time trend. Reported robust standard errors are clustered at the prefecture level. Change of SOE employment share has been standardized to have mean equal to 0 and standard deviation equal to 1. * significant at 10%, ** significant at 5%, *** significant at 1%.

Figure A.2: Robustness check: DID estimate coefficients of the impacts of SOE reform, drop 2007

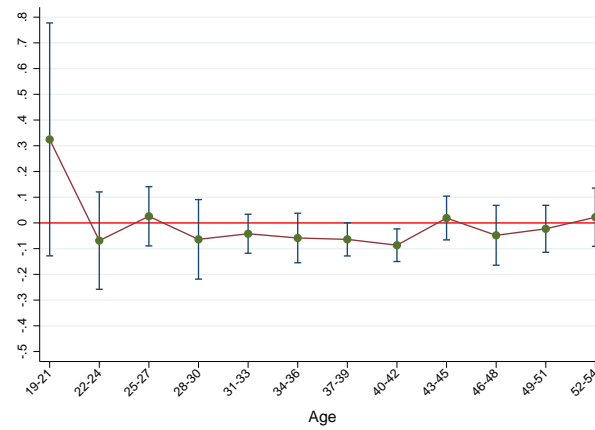
(a) Employment



(b) Retirement



(c) Monthly Earnings



Notes: Regression estimates by Equation 5 are plotted. The dot and the bar correspond to the coefficient estimates with 90% confidence intervals.