Privatization and Gender Inequality: A Life Cycle Analysis in Urban China from 1994 to 2004[*]

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Preliminary and Not For Citation

Abstract

This paper studies the impact of China's state-owned enterprise (SOE) reform, which resulted in more than 35 million layoffs in the 1990s, on gender inequality across the life cycle. We rely on the regional variation in the reform intensity, stemming from initial differences in SOE employment shares, and time variation to identify the impacts. Despite the pre-reform gender equality in the labor market, our analysis reveals that middle-aged women (45-55) experienced a disproportionate likelihood of layoffs compared to men, coupled with diminished re-employment opportunities. This discrepancy primarily arises from the contraction of female-intensive industries and a reduced demand for low-skilled female labor. In the 25-45 age cohorts, females exhibited lower inclination toward both SOE and private sector employment. Furthermore, both genders delayed entry into marriage, likely attributable to increased unemployment post-reform. Lastly, our findings indicate that the SOE reform increased educational investment among young women aged 15-25, highlighting higher education returns as a key pathway.

Keywords: SOE Reform, Labor Market Outcomes, Gender Inequality

JEL Codes: J16, J20, P20, Z10

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1 Introduction

Labor market institutions wield substantial influence on the socioeconomic status of women in developing countries. Notably, in urban China, a centralized labor assignment system was implemented to promote gender equality before the 1990s. However, with the emergence of market-oriented reforms, governmental intervention in the labor market significantly diminished. This study investigates the ramifications of China's privatization initiatives on the widening gender disparity within the labor force, and its intergenerational effects on marriage and educational choices of younger cohorts, thereby impacting the gender gap across the entire life cycle.

Specifically, we focus on the State-Owned Enterprise (SOE) reform in the 1990s. The scope of the SOE reform is remarkable. In the aftermath of this reform, over 35 million workers were laid-off in less than 5 years from 1997 to 2001 (Meng, 2000; Smyth et al., 2001; Solinger, 2002; Hsieh and Song, 2015)[1]. It terminated the centralized labor assignment system that had persisted for over four decades, ushering in market dynamics for the first time within the labor market. Numerous small and medium-sized enterprises got closed or privatized due to their inability to generate profits (Meng, 2000). Specifically, two types of firms were affected by the reform. Apart from SOEs, Urban Collective-Owned Enterprises (UCEs) were also targets. As illustrated in Figure 1, the share of workers in these two types of enterprises sharply declined following the reform.

Gender inequality was extremely small before the SOE reform because of the labor assignment system. Under Mao's ideology of absolute equality, strict and extreme gender equality regulations were implemented[2]. However, Figure 2 shows a sharp increase in the gender gap in employment after 1997, the year when the SOE reform began. The earnings gap began to significantly increase since 1999, two years after the policy was announced. As a result, China's ranking on the gender equality index, as stated in the Human Development Report of 2020, was 85th in the world, placing it behind countries such as Mexico and Thailand.

We ask how the SOE reform affects the gender gap in China's urban labor market and younger women's decision on marriage formation and human capital investment. Even though previous studies have documented the increasing gender gap in the labor market during this period, our contribution lies in establishing the causal linkages. Moreover, given the extensive scope of the reform, we illuminate its intergenerational ramifications on younger women. In sum, we explore how privatization shapes the gender gap across the entire life circle.

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[1]The term *xiagang* ("step down from the post") was used instead of "laying off" in China to describe someone being forced to leave his working unit, because in a socialist society it was politically sensitive to say that someone was laid off.

[2]It resulted in a high female labor participation rate (around 90%) and a relatively small gender wage gap–the female to male earnings ratio was 88%.The figure is according to author's calculation by using China Household Income Survey for 1988 and 1995. Current literature finds that the gender earnings gap was between 7% and 14% in the 1980s, which is smaller than in most OECD countries (Kidd and Meng, 2001).

To answer our research question, we utilize more than ten waves of household surveys, complementing them with a comprehensive manually collected prefectural level employment dataset. To identify the gender-differential effect of the SOE reform on employment and earnings, we adopt an event study strategy with triple-differences, utilizing gender, temporal and geographic variation in exposure to the reform. As indicators of reform exposure, we utilize the pre-reform employment shares of SOEs and UCEs in each prefecture, as these two types of enterprises were primarily affected by the reform.

Our analysis illuminates the gender gap across the life cycle, revealing varied trade-offs that women encounter at different stages. The outcomes are potentially distinctive for distinct age groups, as documented by Goldin (2006) in the U.S.settings.

During the later stages of the life cycle (45-55), women predominantly grapple with the labor-leisure-family trade-off, particularly given their proximity to retirement. The causal effect of SOE reform on their labor market outcomes remains ambiguous. On one hand, female-intensive sectors, such as textile and sewing, experienced a sharp contraction post-reform, resulting in reduced demand for low-skilled female labor. On the other hand, Mao's gender equality ideology may still perpetuate a norm of supporting women within families, potentially leading to an abundant supply of female labor. Our empirical findings shed light on the demand-side dynamics, revealing a causal effect on the increasing gender gap in employment and earnings.

Furthermore, we identify a motherhood penalty within this age range. Mothers with younger children (below 13) are more susceptible to layoffs and less likely to secure re-employment. This implies a change of the gender norm following the reform of labor institution.

Within the prime age bracket (25-45), our findings indicate that females encountered disadvantages in SOE employment, yet their overall labor force participation rates were comparable to those of males. Interestingly, while males exhibited a preference for entering newly emerged private sectors, females demonstrated a greater inclination towards self-employment.

Concurrently, this age range marks the phase where individuals gradually embark on marriage and parenthood, where the conditions of the labor market intricately intertwine with the formation of their families. Existing literature posits that factors such as spousal relative wages, expected wage growth at the time of marriage, and relative wage shocks over time play pivotal roles in influencing spousal bargaining powers (Lise and Yamada, 2019). Challenges faced by women in the labor market may lead to a delay in entering the marriage market, strategically avoiding potential reductions in bargaining power. This assumption is substantiated by our investigation, which highlights the causal effect of SOE reform on the declining marriage rate.

The labor market outcomes can extend their influence to unintended consequences. In the younger age bracket (15-25), women grapple with the pivotal decision of whether to pursue further education or enter the labor market. Two conflicting forces come into play, potentially yielding

divergent results. On one hand, young women might interpret the deteriorating female labor market as indicative of discrimination and consequently reduce their investment in education. On the other hand, despite layoffs affecting low-skilled women, those with higher education may still find value in the labor market.

Our findings illuminate a trend where both genders exhibit a reduced likelihood of entering SOEs, with a more pronounced effect observed among girls. In response, girls proactively increase their investment in education, opting to defer entry into the labor force. In contrast, boys experience unemployment and actively seek job opportunities. These insights shed light on the second force at play.

At the end, we supplement our life-cycle findings by using firm-level data to substantiate the demand-side channel, emphasizing the role of industry composition in shaping the gender gap during the SOE reform. Our analysis demonstrates that prefectures characterized by elevated pre-reform SOE employment witnessed a more pronounced contraction of female-intensive industries following the reform. Our examination does not yield any causal evidence indicating a change in gender discrimination during this period.

This paper contributes to three strands of literature. Firstly, it adds to the extensive body of research on job displacement. Prior studies have established a consensus regarding the enduring earnings loss post-displacement (Jacobson et al., 1993; Couch and Placzek, 2010; DAVIS and VON WACHTER, 2011; Lachowska et al., 2020; Schmieder et al., 2023; Bertheau et al., 2022), with a more pronounced effect for females (Maxwell and D'Amico, 1986; Crossley et al., 1994; Hunt, 2002; Kunze and Troske, 2015; Meekes and Hassink, 2022; Illing et al., 2021). For instance, Illing et al. (2021) find that women experience approximately 35% higher earnings losses than men after mass layoffs, with effects persisting for five years. Our research contributes by investigating a larger-scale layoff context within a developing country characterized by limited labor market institutions. We also stress that we exploit the settings in urban China under Mao's equality ideology prior to the reform. Similar to Illing et al. (2021)'s findings, our research underscores the significance of the supply-side channel by showing the "motherhood penalty". We complement the recent literature on this strand (Angelov et al., 2016; Kuziemko et al., 2018; Kleven et al., 2019a,b) by highlighting that having children under kindergarten age significantly amplifies the gender gap in earnings losses post-displacement. Furthermore, our exploration of household collective responses to job displacement aligns with the essence of the "added worker" effect (Lundberg, 1985; Stephens, 2002; Bredtmann et al., 2018; Halla et al., 2020).

Secondly, we contribute to the literature on the gender gap in human capital investment. Previous examinations of the returns to schooling have consistently indicated that the returns to human capital investment are consistently higher for women in the labor market (Dougherty, 2005; Trostel et al., 2002; Psacharopoulos and Patrinos*, 2004), a trend also observed in China (Zhang et al.,

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2008b). Earlier studies have underscored differences in physical strength (Rendall, 2010; Pitt et al., 2012) and non-cognitive skills (Becker et al., 2010) as two factors contributing to this gender difference. We contribute to this body of literature by leveraging a unique setting in China. In times when the labor market was inflexible, males tended to maintain higher levels of education in line with traditional gender norms. The emergence of a new market dynamic resulted in higher returns to education for women, prompting a convergence in educational attainment between females and males.

Lastly, this paper contributes to a strand of literature that studies the dynamics of gender inequality in China. Studies have discussed the sharp increase in gender gap in China, in terms of both employment and earnings in past forty years (Gustafsson and Li, 2000; Zhang et al., 2008a; Liu, 2011; Chi and Li, 2014; Liu and Zuo, 2023). This is distinct from the pattern of the United States, where the gender gap in employment and earnings has been relatively stable, as shown in Figure A3. Specifically, China's gender gap in the labor force participation rate increased by over 15 percentage points as of 2016, while the gender earnings gap stands at approximately 25% (Liu and Zuo, 2023). Some studies compare the gender earnings gap between the 1980s and 1990s (Gustafsson and Li, 2000; Shu and Bian, 2003; Millimet and Wang, 2006; Zhang et al., 2008a), while others present some descriptive evidence to suggest there might be a link between the economic structural reform and the increased gender earnings gap without an identification strategy (Liu, 2011; Meng, 2012; Whalley and Xing, 2014; Liu and Zuo, 2023). Previous papers do not discuss the causal relationship between the SOE reform and increased gender gaps. To the best of our knowledge, this paper is the first to make progress on better understanding how the SOE reform has increased gender inequality at the individual level.

For the rest of the paper, we discuss the reform background in Section 2 and introduce the data in Section 4. We present our main empirical strategy in Section 5 and show the results in Section 6. Section 7 concludes.

2   Background

Historically, Chinese women's social and economic status was extremely low. It was largely shaped by Confucianism. For example, women were required to "obey fathers when young, husbands when married, and adult sons when widowed". In addition, they were generally not allowed to work outside the home (Johnson, 2009). As a result, they were fundamentally economically dependent on their patriarchal family. In this section, we first describe how women's economic status was strongly promoted by the political power from 1950s to 1990s. In the second part of this section, we provide a complete picture of the SOE reform in the 1990s and its consequence.

Labor Assignment Systemn from 1950 to 1990 in Urban Areas   The establishment of a Communist government in 1949 was followed by a series of social, economic and political experiments under the new regime's Marxist ideas that aimed to create a socialist society, promoting women's rights and their position (Entwisle and Henderson, 2000). From 1950 to 1990, women's social status in China 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 Constitution abolished polygamy, child betrothal, and interference in the remarriage of widows (Meijer, 1971). For the first time, the 1950 Marriage Law legalized equal status for wife and husband at home, and decreed that marriage should be based on the complete willingness of the two parties. Later, 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 the Sky" ideology.

In addition, starting from the 1950s, the Chinese government established a strict central planning system to arrange labor under the ideal of absolute equality (Entwisle and Henderson, 2000). First, the labor arrangement and wage rate were completely centrally determined in the urban areas.[3] 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.[4] No individual would be allowed to search for a job themselves and no work unit could choose workers independently (Meng, 2000; Liu and Zhang, 2008). Furthermore, individuals were not allowed to quit or change their jobs except for promotion. These assignments were life–time employments with a fixed wage. There were 8 wage levels for factory workers and technicians, and 24 levels for administrative and managerial workers, with some variation 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 education for workers' children. China has kept most formal institutions that guaranteed gender equality during that period. No doubt, these socialist policies had shrunk the absolute size of the gender gap during this period (Zhang et al., 2008b; Yang, 1999).

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[3]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. Until the late 1980s, China's economy was divided into two mutually exclusive parts.

[4]Generally speaking, political background indicates the length that an individual had been in the Communist Party.

Post–1990s, Period of SOE Reform   The economic reform started in rural areas with the fast–growing township enterprises, and later, with the set–up of four Special Economic Zones along the south-eastern coast of China.[5] By the mid–1990s, it became obvious to the central government that most SOEs failed to compete with the growing private firms because of the lack of incentive schemes for workers and managers (Lin et al., 1998; Lin and Tan, 1999; Perkins, 1994).

By that time, about half of these SOEs were experiencing losses, and the number of redundant workers was estimated to reach as high as 20-30% of total workers (Xianguo, 2007). However, the issue of SOE reform was politically sensitive because life–time employment and equal pay with equal jobs were regarded as two key characteristics of a socialist society. The data from the National Bureau of Statistics suggests that the employment of SOE peaked at about 109.5 million in 1995. It was not until the 15th Communist Party Congress in September 1997 that the central government endorsed SOE reform (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 state ownership and merge, privatize or close most other medium–to–small firms. By the end of 2002, the number of SOE workers fell to 69.2 million, a 36.8% decline compared with the number in 1995.

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 security of non–contract life–time employment, and their wages were determined by market forces. And although the new SOE still had some monopolistic power in several specific sectors, they did not bear any other social responsibilities as before (Lee, 2000; Solinger, 2002).

Previous studies have demonstrated the positive impact of the SOE reform on the Chinese economy, notably mitigating overstaffing issues and enhancing overall efficiency within the public sector (Hsieh and Song, 2015; Berkowitz et al., 2017). Also, people who remained in the SOE sector after the reform enjoyed a SOE wage premium (Ge and Yang, 2014). Nonetheless, our own work (Xu and Zuo, 2023) highlights an additional facet of these reforms, revealing their unintended consequence of exacerbating income inequality. It indicates that, in comparison to prefectures with lower initial SOE employment shares, those with higher proportions experienced not only diminished employment rates but also reduced income levels.

In terms of gender equality, the SOE reform symbolized the end of a special era when women were vigorously protected by the government in the labor market. Although laid–off workers were entitled to receive living allowances and unemployment benefits from the government to maintain a minimum living standard, current studies suggest that only about 34% of individuals experienc-

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[5]Township enterprises are another form of collective-owned Enterprise, but the ownership belongs to farmers in the rural areas.

ing job separations between January 1996 and November 2001 were employed again within 12 months of leaving their jobs (Cai et al., 2008). In addition, the absence of anti–discrimination laws carried the potential to disadvantage women in the labor market disproportionately and offers the possibility of the resurgence of gender discrimination culture in China (Cooney, 2006; Lee, 2000).

The Gender-Specific Retirement Policy   Understanding whether women are more likely than men to be laidoff is the first order interest. In our context, this may be related with the retirement policy. Starting from the 1950s, the standard retirement age has been 50 or 55 for women and 60 for men, respectively. The retirement age of 55 is applicable to women working in government and public institutions, while the retirement age of 50 may be more common for other occupation, such as factory workers, service staff, and domestic workers. Between 1996 and 2001, workers within five years of the normal retirement age were also allowed to apply for early retirement (*Nei Tui*) as a response to the reform (He et al., 2018). They were first internally retired with a lump-sum allowance determined by their salary and years of service in their work units, and then turned to the Social Insurance Administration for retirement pension after reaching the normal retirement age (Lei and Liu, 2018).

3   Conceptual Framework

How does the SOE reform differentially impact people's socioeconomic outcomes across genders throughout the life cycle? Women navigate varied trade-offs at different life stages, shaping distinct key outcomes of interest.

Firstly, our focus lies on labor market outcomes across genders. Women in both prime and older age groups grapple with multifaceted trade-offs involving labor, leisure, and family responsibilities. The impact of the SOE reform on women's labor market outcomes reveals two conflicting forces from the demand and supply sides.

On one hand, the reform induces significant changes in industry structure, affecting the demand side of the labor market. The 1990 census highlights industries with the highest female labor share in urban areas, such as sewing, textile, and catering. Notably, comparing 1990 and 2000 census data, the employment share of the textile and sewing industry decreased by 3 percentage points, signaling a contraction in female-oriented industries. Pre-reform, these sectors played a crucial role in employing low-skilled female workers. This contraction could result in increased female layoffs, compounded by lower educational attainment and the shrinkage of their former industries, posing challenges for re-entering the labor market. Consequently, this may disproportionately impact females negatively.

On the other hand, on the labor supply side, gender norms underwent a dramatic transformation in the four decades leading up to the reform. Mao's ideology, encapsulated in the phrase "Women can hold half of the sky," underscored absolute gender equality, reflected in high female labor force participation. If such norms persist in the competitive market, one might anticipate husbands supporting their wives in securing re-employment, sharing household responsibilities, and encouraging continued labor supply.

Labor market dynamics not only hold significance in themselves but also extend their impact on younger women's decisions regarding marriage formation and education investment. As spouse wage gap at the time of marriage formation may affect household bargaining power (Lise and Yamada, 2019), challenges in the labor market might dissuade individuals from entering marriage.

In terms of education, with the gender gap in the labor market widening, conflicting forces may influence opposing results. If the labor market exhibits bias favoring males and generally discriminates against women, the returns on education for women could decline. Conversely, reform-induced changes in the labor market structure, where males are perceived as more physically advantaged in low-skilled jobs and female-intensive sectors shrink, could elevate education returns for women compared to men, assuming no discrimination occurs in high-skilled jobs.

4 Data

4.1 Urban Household Survey (UHS)

Our study employs the Urban Household Survey (UHS), which was conducted by the National Bureau of Statistics of China. This survey is a repeated cross-sectional dataset that includes detailed individual and household demographic information, such as gender, age, education attainment, marriage status[6], and a set of labor market variables. We have access to 16 provinces covering 201 prefecture-level cities during the study period, 1992-2004. We exclude the cities that experience boundary changes over the period and the cities that have obvious measurement error in our treatment variables, resulting in a sample of 157 cities.

We restrict our study to individuals between the ages of 15 and 54. We choose the lower bound age 15 as this is the lowest age for labor force participation in China. We also take the retirement age in consideration, which is 60 for men and 55 or 50 for women, respectively. We further restrict our sample to non-migrants by dropping individuals without local registration (Hukou) who have limited access to education, medical care, and social welfare in the place they reside, as regulated by China. Migrants account for a small proportion of the sample, constituting only 2% after 2002,

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[6]The UHS doesn't marriage status before 2002, so we infer this information according to each member's relationship to the household lead. We provide more details in Appendix B.

with no migrants present in the survey before that year. Migration might impose a threat to our identification strategy, but we argue that migration is quite limited in 1990s China due to the Hukou restriction, especially from urban to urban.[7]

We also exclude prefectures in Guangdong province for the baseline analysis for two reasons. Firstly, Guangdong was at the forefront of the economic reform even before the SOE reform in the 1990s. Shenzhen, a main city in Guangdong, became a special economic zone (SEZ) in 1980, as part of a series of economic reforms aimed at opening up the country to foreign investment and trade. Shenzhen was chosen for its proximity to Hong Kong, which was already a major center of commerce and industry at the time. Secondly, Guangdong province is a main destination for migration after the economic reform in China, mainly from rural to urban areas. This is because Guangdong benefited from the economy reform in the 1980s and provided more job opportunities.

Two sampling issues arise with the use of the UHS in our study. The first issue is the over-representation of SOE employees, a problem that was first identified by Ge and Yang (2014). The second issue arises from a major reform of the UHS in 2002, which tripled the sample size. To address these issues, we implement a reweighting strategy: we create the weight of each individual according to their employment type by comparing the public sector's employment share in the UHS and the statistical-yearbook data. Also, we adjust the weight with reference to the sample-size difference before and after 2002. We present details of our weighting process and the validity of the strategy in Appendix A.

We present individual characteristics, including age, marital status and years of schooling, by gender in Table A5 for the full sample. From the before reform time period (Panel A) to the after the reform period (Panel B), we observe that workers became slightly older and more educated. But within each time period, females were more likely than males to get married and gender gap in education attainment persisted.

Because we aim to do a life-cycle analysis and gender inequality will be different in different dimensions across the life cycle, it is important to show gender gaps in different labor market outcomes by age groups. From Table 1 to Table 4, we present gender gaps in various employment outcomes and earnings by four age groups. First, we find that the youngest cohort performed significantly different from other groups. For example, we do not observe significant gender gaps

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[7]We note a discrepancy between wage and working status information in our dataset, where some individuals may claim not to be working but report positive wage income, and vice versa. These discrepancies account for approximately 2-3% of the total observations. As our focus is on any form of labor attachment, we choose to assume that wage income accurately reflects labor market engagement. To this end, we redefine the working status variable based on wage income. Specifically, we classify individuals with wage income as employed and in the labor force, and individuals with labor income are considered to be in the labor force regardless of their self-reported working status. Conversely, individuals with no wage income are assumed to be not employed, and those with no labor income are considered to be out of the labor force. This approach ensures that we capture any kind of labor attachment as a labor market outcome while minimizing the impact of the discrepancies in our data.

in earnings in this cohort, both in the before and after the reform period, but for other age groups, females earned less than males, and gender gaps have increased in the after reform time period. To be specific, it increased by approximately 8% for the group age between 25 and 35, and the earnings gap has increased by nearly 30% for the oldest cohort. Second, Workers were significantly less likely to sort in the public sectors in the after reform period across all age groups. But, females were more likely than males to leave the public sector than males in the prime age and old cohorts. We also find that gender gap in employment has significantly increased in these two cohorts in the after reform time period. In addition, females were much more likely to retire early than males in the old cohort.

4.2   Prefecture-level Data

We utilize prefecture-level data obtained from various China's statistical yearbooks for three specific purposes. Firstly, these data play a vital role in calculating the extent of prefecture exposures to the SOE reform. Secondly, we employ a weighting strategy (discussed in Section A) that adjusts the employment composition in the UHS based on the information provided by the statistical yearbooks. Thirdly, we conduct a balance check on the exposure variables by referring to the prefecture-year level economic indicators.

To obtain the employment data (coded as *zhigong*) at prefecture level for our analysis, we collected information from three sources: Provincial Statistical Yearbooks, City Statistical Yearbooks, and China Statistical Yearbook for Regional Economy. From these statistical yearbooks, we use the employment data coded by formal employment (*Zhigong*) rather than any type of employment (*Jiuye*). This is because the broader definition of employment (*Jiuye*) also includes contractual workers, who lack job security provided by the public sector, are not the target of the reform. [8]

To calculate the public sector employment-to-population ratio, we used the 15-64 non-agriculture population from the 2000 census as the denominator for each year. The numerator is the total of government, SOE, and collective employment.[9] We encountered data missing problems in the numerator, so we first digitized data from the provincial and city statistical yearbooks. We then used the China Statistical Yearbook for Regional Economy to fill in the missing data for the working

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[8]In terms of the employment data from the Statistical Yearbook, we notice a new definition of formal employment, working employment (*zaigang zhigong*) emerging after 1998 as a response to the massive layoff during the reform. This is due to some laid-off workers continuing to receive partial compensation from their former employer, even though they are no longer working. As a result, these workers are classified as non-working employment and are included in the formal employment (*zhigong renshu*) but not in the working employment (*zaigang zhigong*). Therefore, we use the working employment (*zaigang zhigong*) measure for the employment variable. For years before 1999 when only a single definition of formal employment (*zhigong renshu*) is available, we assume that the two definitions are equivalent.

[9]The government sector was not affected by the reform, but we can't separate SOE and government employment from the statistical yearbook data. It is not a concern here as the proxy is the change of public employment. As government employment share stays stable in this period, the change mainly comes from the layoff in SOE and UCE.

employment (*zaigang zhigong*) from 1999 to 2004. For the missing data prior to 1999, we used linear interpolation.

We provide the summary statistic of the employment shares by prefecture in Table A3 and validate these treatment measures in Section C.

5   Empirical Strategy

We employ both the differences-in-differences and the triple-differences event study approach to causally identify how the SOE reform affects females and males differentially. Our approach leverages variation across three key dimensions: geographic, temporal, and gender.

5.1   Measures of the Exposure to the Reform

Pre-reform SOE and UCE Shares   We utilize the share of SOE and UCE employment in 1992 (the beginning year of our analysis) as the exposures to the reform. We hypothesize that areas with high pre-reform SOEs and UCEs employment share are more impacted by the reform than those low pre-shares areas. The key advantage of relying on the pre-reform regional variations in the pre-shares is that they are orthogonal to any unobservable prefectural level characteristics that may impact individuals' labor market outcomes that we are interested in.

The definition is presented in Equation 1 and 2. We calculate the affected employment as the numerator, using the 15-64 non-agricultural population[10] as the denominator. The population data is sourced from the 2000 Population census.

$$\text{Pre-SOE Emp Share}_p = \frac{\text{Affected SOE Employment}_{p,1992}}{\text{Working-age Population}_p} \tag{1}$$

$$\text{Pre-UCE Emp Share}_p = \frac{\text{Affected UCE Employment}_{p,1992}}{\text{Working-age Population}_p} \tag{2}$$

We acknowledge that not all industries are impacted by the reform. To create a more precise measurement of the proxy for the reform, we exclude certain 2-digit industries from the numerator, including government, agriculture, finance, real estate, health, and education[11]. Although these industries are not the target of the reform, they still contribute to a portion of the total SOE and UCE employment, particularly in the case of SOE employment (Lee, 2000). According to the China Labor Statistical Yearbook, more than 90% of employment in these industries belongs to SOEs in 1992. To exclude these industries from the shares of total SOE and UCE employment,

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[10]The Hukou system in China categorizes individuals based on their agricultural or non-agricultural attributes.

[11]According to the data from China Labor Statistical Yearbook, these industries are not the target of the reform.

we refer to the 1990 population census, which provides industry-specific employment information for each prefecture. However, the 1990 census does not offer any employment data categorized by ownership. Therefore, we consult the China Labor Statistical Yearbook to obtain information on the proportion of SOE and UCE workers in each industry.[12] Utilizing these proportions, we calculate the shares of employment by industry and ownership out of the overall working-age non-agricultural population.[13] In this way, we manage to exclude the unaffected industries in SOE and UCE employment from our pre-shares.[14]

Additionally, we acknowledge that certain 3-digit industries are also unaffected by the reform. As a robustness check, we rely on the Annual Survey of Industrial Firms (ASIF) to identify these 3-digit industries and exclude them from the pre-shares using employment data from the 1990 census. It is worth noting that the employment within these industries typically constitutes less than 0.1% of each prefecture's total employment, and thus does not significantly impact our analysis.

5.2 Event Study Approach

$$
\begin{aligned}
Y_{ipt} =& \alpha + \beta_1 \text{Post}_t \times \text{Prereform SOE Emp Share}_p + \beta_2 \text{Post}_t \times \text{Prereform UCE Emp Share}_p \\
& + \Phi X_{ipt} + \delta_p + \gamma_t + \varepsilon_{ipt}
\end{aligned} \tag{3}
$$

We provide two sets of equation to identify how the SOE reform affects the gender gap. Firstly, we split the sample by gender and conduct the event study design as shown in Equation 3. To be specific, we exploit the variation at geographical and temporal. We use both the *Pre-SOE Emp Share* and *Pre-UCE Emp Share* as the geographical level proxies to the reform. The outcome variables are *Employment* and *Earnings*. We compare the coefficients across the male and female sample to examine the gender-differential effect. Compared to a standard Diff-in-Diff model, the event study approach provides two key advantages. Firstly, it enables us to examine the effect over a period of time, thereby enhancing our understanding of how the reform affects the labor market dynamics by gender. Secondly, by examining the coefficients prior to the reform period, we can also assess the pre-reform trend for the parallel trend assumption.

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[12]We provide this information in Table A2.

[13]We adjust for population growth from 1990 to 2000.

[14]A tiny proportion of the pre-SOE share is negative because of the measurement error across the multiple data sources.

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\begin{aligned}
y_{ipt} = \beta_0 &+ \sum_{e=1992}^{2004} \beta_e \text{Pre-SOE Emp Share}_p \times \text{year}_t \times Female_i \\
&+ \sum_{e=1992}^{2004} \beta_e \text{Pre-UCE Emp Share}_p \times \text{year}_t \times Female_i \\
&+ \sum_{e'=1992}^{2004} \beta_{e'} \text{year}_t \times Female_i \\
&+ Female_i + X_{ipt} + \eta_{p,female} + \mu_{pt} + \varepsilon_{ipt}
\end{aligned}
\tag{4}
$$

Secondly, apartment from the geographical and temporal level, we add a gender level and conduct a triple-difference design as shown in Equation 4.

The coefficient of interest in our analysis is denoted as β_e, which captures the differential impact of the SOE reform across genders. Since our primary focus is on examining the gender-specific effect of the SOE reform, it is crucial to include controls for the interaction between the variation in each of the two dimensions. Firstly, we incorporate an interaction term between the binary variable *Female_i* and the indicator variable *year*, which serves as a control for the national gender differential trend. To provide some context, Figure 2 illustrates the increasing gender gap in Employment and Earnings over the study period. This upward trend suggests that there might be other policies or factors contributing to the widening gender gap in China. For example, Wang et al. (2022) found that increasing import competition played a role in retaining more females in the workforce, thereby mitigating the otherwise growing gender employment gap in the long run.

To account for time-varying unobserved factors specific to each prefecture, we include a prefecture-year fixed effect. This fixed effect absorbs the overall effect of the SOE reform on China's urban labor market, allowing us to isolate the gender differential effect. Moreover, it helps control for the influence of other reforms implemented during the study period. It is worth noting that China underwent a series of reforms spanning from 1978 to the early 21st century. In this study, we specifically focus on the impact of the SOE reform in the late 1990s, characterized by extensive layoffs. However, other policies such as China's accession to the World Trade Organization (WTO) in 2001 (Dai et al., 2021; Erten and Leight, 2021), the expansion of college programs starting in 1999 (Che and Zhang, 2018), and the housing property reform in 1994 (Wang, 2012, 2014) may introduce confounding factors and need to be taken into account.

Additionally, we introduce a prefecture-gender fixed effect to capture time-invariant gender norms specific to each prefecture. Existing literature has demonstrated that historical gender norms can intrinsically affect female labor supply (Qian, 2008).

In addition to these fixed effects, our model includes control variables such as *Female*, *Educa-*

tion, and *Age* for the age group above 25[15]. These variables account for individual characteristics that could influence employment and earnings outcomes. To address any potential correlation within prefectures, we cluster the standard errors at the prefecture level.

6 Results

In this section, we only show the coefficients plots for the treatment variable *Pre-SOE Emp Share*. This is because the coefficients associated with *Pre-UCE Emp Share* largely exhibit insignificance in Equation 4. This suggests a lack of substantial gender-differentiated effects in prefectures characterized by higher *Pre-UCE Emp Share*. This disparity in the effects can be attributed to the distinct declining employment share trends for SOEs and UCEs observed in Figure 1. We note that the employment in SOEs decreased by approximately 40%, while the decline in UCE employment exceeded 70%. Given the notably more substantial layoffs within UCEs compared to SOEs, it's understandable that a comparatively weaker gender differential effect is evident within the UCE sector. One plausible explanation for this pattern is from an employer's standpoint. When compelled to enact significant layoffs, UCEs might have been less inclined to differentiate between workers based on gender. Instead, the emphasis could have been on indiscriminate workforce reduction, affecting both genders, and subsequently leading to a muted gender differential effect.

We present our results in the different age groups in the below subsections to show the effects on gender gap over the whole life cycle.

6.1 Employment and Earnings Gender Gap: 45-55

We first present the employment and earnings outcomes for individuals aged 45-55, an age range within which women faced a labor-leisure-family trade-off. This group of people were also subject to an early retirement policy. The demand for female labor force could decline, given their proximity to the retirement age and the contraction of female-oriented industries. On the other hand, the labor supply could also be high, if Mao's gender equality ideogoly persists.

To illustrate the impact, we utilize event study graphs featuring the treatment variable *Pre-SOE Emp Share* in Figure 4. Our findings reveal a gender disparity in the consequences of layoffs, as highlighted by the SOE Employment variable in panel (a). While both genders are affected by the SOE reform, females are disproportionately more likely to experience layoffs. Interestingly, despite the challenges posed by the reform, males exhibit a capacity for re-employment and even benefit from the policy in terms of earnings, as depicted in panels (b) and (c). This aligns with existing literature (Song et al., 2011; Hsieh and Song, 2015), suggesting improved aggregate efficiency

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[15]We verify that the education outcome is not affected by the SOE reform.

benefiting select workers. Notably, the post-reform State-Owned Enterprise (SOE) wage premium increased (Ge and Yang, 2014). In contrast, females face difficulties in re-entering employment, resulting in negative impacts on both their employment status and earnings. Our investigation extends to the retirement outcomes illustrated in panel (d). We observe that the gender-specific effects within the 45-55 age group are driven by the gender-specific retirement policy. Following the reform, females tend to opt for retirement, subsequently exiting the labor force. In contrast, males demonstrate an ability to secure new employment opportunities.

In terms of the effect size, we present the analysis of the coefficient of Pre-SOE Emp Share in Table 5. The results are reported separately for females and males, and we also present the triple difference results as outlined in Equation 4.

The coefficient of SOE employment is -0.501, meaning that 100 p.p. more in SOE employment prior to the reform leads to 0.501 p.p. increase in employment gender gap for a prefecture with mean of the exposure, compared to the prefecture with zero exposure. By interacting with the mean of pre-SOE employment share (0.32), the results show that the SOE reform leads to 16 p.p. increase in employment gender gap.

The coefficient of overall employment is -0.401, slightly larger than that for SOE employment. This indicates that although females were more likely to experience layoffs during the reform, some managed to secure re-employment. Results regarding early retirement suggest that the employment gap was primarily driven by the early retirement policy.

We also examine the effect on earnings. Since we use the inverse hyperbolic transformation for the income variable, we need to interpret the effect in percent. In the long run , the coefficient is -0.428, meaning that 1 p.p. increase in pre-SOE employment share leads to 42.8% increase in earnings gender gap. Interacting with the mean of pre-SOE employment share (0.32), the results indicate a 13.7% increase in the earnings gender gap due to the SOE reform.

Heterogenous Effects by Education   Higher education is generally presumed to be associated with white-collar and high-paying job. They are also better in providing benefits, such as pension.[16] We delve into variations based on educational attainment, as shown in Table 9. We split the sample by three different groups of education attainment, i.e. below high school, high school, and above high school.

Notably, we discover that the gender disparity resulting from the reform is most pronounced among individuals that are not high school graduates and those with 2-year or 4-year college education. We are not surprised by the results of people with less than high school education. Given their likelier engagement in manual labor, females within this group face a higher risk of layoffs due to potentially lower physical strength and, consequently, reduced productivity. This observation

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[16]In fact, some SOEs provide little pension even the employees got retired during the reform.

offers preliminary support for the productivity differential channel as a driver of post-displacement gender discrepancies.

For individuals with higher education, a majority were employed in SOEs and held positions of higher responsibility. Consequently, there is a more pronounced gender gap observed in SOE employment following the reform. Additionally, these individuals had the advantage of receiving more favorable pension benefits if they opted for early retirement. As a result, their opportunity cost of leaving the labor market is comparatively lower than that of other groups. This is evident in the larger coefficient associated with the outcome of early retirement.

Heterogenous Effects by Age of the Youngest Child in the Household We explore the heterogeneous impact based on the age of the youngest child in the household. Women typically shoulder more family responsibilities under traditional gender norms, particularly when children are young. Leveraging this fact, we examine the persistence of Mao's gender equality ideology and its potential impact on labor supply.

We present the results in Table 10. We identify a more prominent gender differential effect for households with a youngest child below 13 years old. This age range aligns with the youngest age at which children typically enter middle school. Despite the relatively constrained sample size, approximately 3000 individuals, within the age bracket of 45-55, we discern that the prevailing gender gap is predominantly attributable to households with children below 13 years. The results persist in the outcome SOE employment, overall employment, earnings, and early retirement. This means females with younger children face more challenges no matter for the lay-off or seeking new employment.

This finding implies that Mao's ideology didn't help with female labor supply during the privatization movement. It also sheds light on the motherhood penalty, wherein mothers with younger children face a heightened likelihood of involuntary job termination and encounter increased challenges in securing subsequent employment. Our observation aligns with extant literature on job displacement in other countries' contexts, including (Angelov et al., 2016; Kuziemko et al., 2018; Kleven et al., 2019a,b).

6.2   Sector Gender Gap and Marriage Response: 25-45

In the prime age group of 25-45, we find no discernible overall gender gap in overall employment and earnings. However, an interesting gender difference emerges in the sectors individuals choose to work in.

Our results for the 35-45 age group, displayed in Figure 5 and Table 6, reveal several noteworthy insights. Firstly, while the reform resulted in layoffs in the first three years, the effects were

comparable for both genders, with no significant disparities in terms of employment and earnings. This suggests that both males and females were successful in securing new employment following the layoffs. However, a distinctive gender contrast surfaces when considering entry into the private sector, as illustrated in panel (d). Generally, male employment in the private sector remains relatively consistent across different areas. In contrast, females who were exposed to higher levels of SOE employment before the reform had a relative negative effect in private sector employment. This results in less females employed in the private sector, yielding the coefficient -0.07. While private sector emerged post-reform (Fang et al., 2023), it exhibits a distinct preference toward males.

We also present the results of the 25-35 age group, as shown in Figure 6 and Table 7. In terms of SOE employment, while females were adversely affected, the effect on males is much smaller. We also find that the unemployment rate increased for both genders. Notably, a gender-specific sectoral difference emerges, with males exhibiting a relatively reduced likelihood of being self-employed, while females remain unchanged, leading to an increased likelihood of females being self-employed. It could be possibly due to the diminished opportunities in other sectors for females.

Furthermore, we observe an intriguing trend in marriage outcomes for both genders within this age group – there is a delay in their entrance into the marriage market. This pattern suggests a causal effect with reduced opportunities in the labor market, contributing to the decision to postpone marriage. The decision to marry is often linked to the anticipated household bargaining power at the onset of marriage. Expected earnings constitute a significant factor in determining bargaining power (Lise and Yamada, 2019). Consequently, it is unsurprising that individuals of both genders opt to postpone marriage.

6.3 Education Gender Gap: 15-25

We present the results for age group 15-25 in Figure 7 and Table 8. Our initial examination focuses on the outcome of SOE employment, revealing a declining likelihood for both genders to enter the SOE sector. Notably, starting from 2000, this negative effect became more pronounced for females, further exacerbating the gender gap. Interestingly, the response to this trend varied between genders. Males tended to opt for unemployment while actively searching for new job opportunities, as depicted in panel (b). In contrast, females chose to invest more in education, as illustrated in panel (d). Additionally, we note that both genders demonstrated a slight increase in the likelihood of entering the private sector.

Discussion on the Mechanism In response to the SOE reform, a discernible divergence emerges in the choices made by younger girls and boys. While young girls lean towards higher investment, their male counterparts tend to opt for unemployment. This dichotomy mirrors a broader educational trend, as illustrated in Figure A6, where evidence reveals a narrowing gender gap over the years. Notably, both genders witness an increase in educational years, with females experiencing a notably swifter growth.

The question arises: why do young boys and girls react differently to the reform? The answer may lie in the abrupt shift the younger generation witnesses—from absolute gender equality to a competitive market where gender gap becomes apparent. Girls could understand the transition in two ways. Firstly, it may stem from historical lower educational attainment among females compared to males. This could lead to asymmetries in labor market opportunities favoring one males after the reform. Given the biological disadvantage that females may face in physically demanding jobs, a shift in industry demand towards high-skilled labor might render investing in education more lucrative for girls. Consequently, they may strive to match their educational attainment with their male counterparts. Secondly, the widening gender gap could be perceived as a consequence of gender discrimination in the competitive market. If girls anticipate discrimination regardless of their educational investments, they might be discouraged from pursuing higher education.

Our empirical findings substantiate the first hypothesis—that education returns for girls increase in the aftermath of the reform. This aligns with the observations made by Zhang et al. (2008a). Even in the presence of gender discrimination, the results suggest that females with higher education have a better chance of navigating the challenges. However, the necessity for higher education to compete with males in the labor market remains evident, assuming all other factors are equal.

6.4 Demand-side Evidence

In Section 3, we provide illustrative evidence highlighting the contraction of female-intensive industries and and speculate on gender discrimination as a potential mechanism. In this section, we offer causal evidence elucidating the relationship between the SOE reform and both industry composition and discrimination indices.

Contraction of Female-Intensive Industries An essential query arises: Do extensive layoffs disproportionately impact historically female-oriented sectors? We address this by employing a shift-share design based on Kis-Katos et al. (2018) and Wang et al. (2022). The share component leverages the initial female intensity (the proportion of females among all workers) in each two-digit sector s at the national level, $FI_{s,0}$, gleaned from the 1990 census. The shift component,

E_{spt}/E_{pt}, gauges employment changes in sector s within prefecture p across 1990 and 2000[17]. The female industry index is as defined in Equation 5.

$$FI_{pt} = 100 \times \sum_{s=1}^{S} \left(\frac{E_{spt}}{E_{pt}} \times FI_{s,0} \right) \tag{5}$$

To explore potential correlations between reform proxies and shifts in historically female-dominated industries, we conduct regressions of the index on both the Pre-SOE Emp Share and the Pre-UCE Emp Share. The outcomes are displayed in the first and third columns of Table 11. Notably, we observe that a higher Pre-SOE Emp Share predicts a decrease in historically female-dominated industries, whereas the Pre-UCE Emp Share does not yield such an effect. This outcome aligns consistently with our baseline findings, reinforcing that only the Pre-SOE Emp Share serves as a predictive indicator of the gender gap stemming from the reform.

This result suggests a discernible shift in the market dynamics toward favoring males after the reform. Illustratively, the transformation is evident in historically female-oriented sectors such as the cotton industry, where a substantial number of low-skilled female workers were employed in factory settings. The contraction of such industries has resulted in diminished opportunities for females in the labor market, thereby elucidating the challenges faced by women in the 45-55 age bracket in securing re-employment. The diminishing presence of low-skilled, female-oriented sectors has contributed to an increased return on investment for education among women, compelling younger girls to extend their education years.

A Test of Gender Discrimination   We further ask whether the reform leads to a rise of the industry that becomes more gender discriminate. Prior to the reform, the wage determination system within the SOEs is quite rigid, and there was little room for gender discrimination with respect to wage. After the reform, wage setting system became more flexible. Inspired by Bayard et al. (2003) and Wang et al. (2022), we conduct a test on gender discrimination shown as following.

According to Becker (1957)'s theory on gender discrimination, within a sector that contains both discriminating and non-discriminating employers, non-discriminating firms should be able to earn higher profits due to lower wage payment to female workers. Using 2004's economic census data, we run the regression on each firm as shown in Equation 6, where Π_{fs} denotes the inverse hyperbolic sine of profits obtained by firm f operating in two-digit sector s. Our main variable of interest is FSh_{fs}, which measures the share of female workers among each firm's employees. The vector of controls X_{fs} includes each firm's output share within the product market to measure its market power, categories of firm age, its share of skilled employees, an indicator for exporter

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[17]Employment data by sector is sourced from the 1990 and 2000 census. Given industry classification changes, the authors manually establish linkage between systems.

status, and an indicator of private ownership.

$$\Pi_{fs} = \beta^{st} FSh_{fs} + \gamma^s X_{fs} + \varepsilon_{fs} \tag{6}$$

We collect the industry-specific coefficients $\hat{\beta}^{st}$, which capture sectoral estimates of the relative strength of labor market gender discrimination against females. A positive value of $\hat{\beta}^{st}$ indicates the existence of discrimination against women. We transform these sectoral discrimination coefficients, $\hat{\beta}^{st}$, into a prefecture-wide discrimination index, $DI_p t$, that computes the local prevalence of discriminating sectors by using industrial employment shares of each sector s in year t within each prefecture p as weights, as shown in Equation 7. We use the change of discrimination index from 1990 to 2000, using the population census respectively, as a proxy for the rising gender-discriminating industries within each prefecture.

$$DI_{pt} = \sum_{s=1}^{S} \frac{E_{spt}}{E_{pt}} \times \hat{\beta}^s \tag{7}$$

We regress the change of discrimination index on both Pre-SOE and Pre-UCE emp share and present the results in the second and fourth columns of Table 11. In general, the evidence of gender discrimination is not clear. This result is consistent with the findings of previous literature (Dong and Zhang, 2009). It suggests that there is no evidence to ensure the gender gap in labor market after the SOE reform is driven by gender discrimination.

7   Conclusion

China has experienced a significant surge in gender disparities, encompassing both employment and earnings (Zhang et al., 2008a; Liu, 2011; Liu and Zuo, 2023). This study delves into the repercussions of China's 1990s SOE reform – a government initiative privatizing the urban labor market — on gender inequality in socioeconomic outcomes. Recognizing the diverse trade-offs that females encounter throughout their life cycles, we provide an age-specific analysis.

Our findings reveal that women in the 45-55 age cohort were disproportionately affected by layoffs during the reform compared to their male counterparts. Specifically, the SOE reform results in a 16 p.p. increase in the employment gender gap and a 13.7% rise in the earnings gender gap for prefectures with mean pre-reform SOE employment share. This disparity is predominantly observed among individuals with education levels either above or below high school, and we identify a "motherhood penalty," with women with younger children (below 13) experiencing heightened effects.

For the 25-45 age group, no overall employment and earnings gender gap is observed. How-

ever, females exhibit a reduced likelihood of working in SOEs or the private sector compared to males. Additionally, both genders delay entry into marriage, possibly in response to increased unemployment.

Lastly, our investigation into the 15-25 age cohort reveals challenges for both genders in entering the labor market, particularly the SOE sector, with a more pronounced adverse effect for females. Intriguingly, females respond by increasing their investment in education, a pattern not observed among males.

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Figures

Figure 1: Share of Urban Labor Force Working in SOEs and UCEs
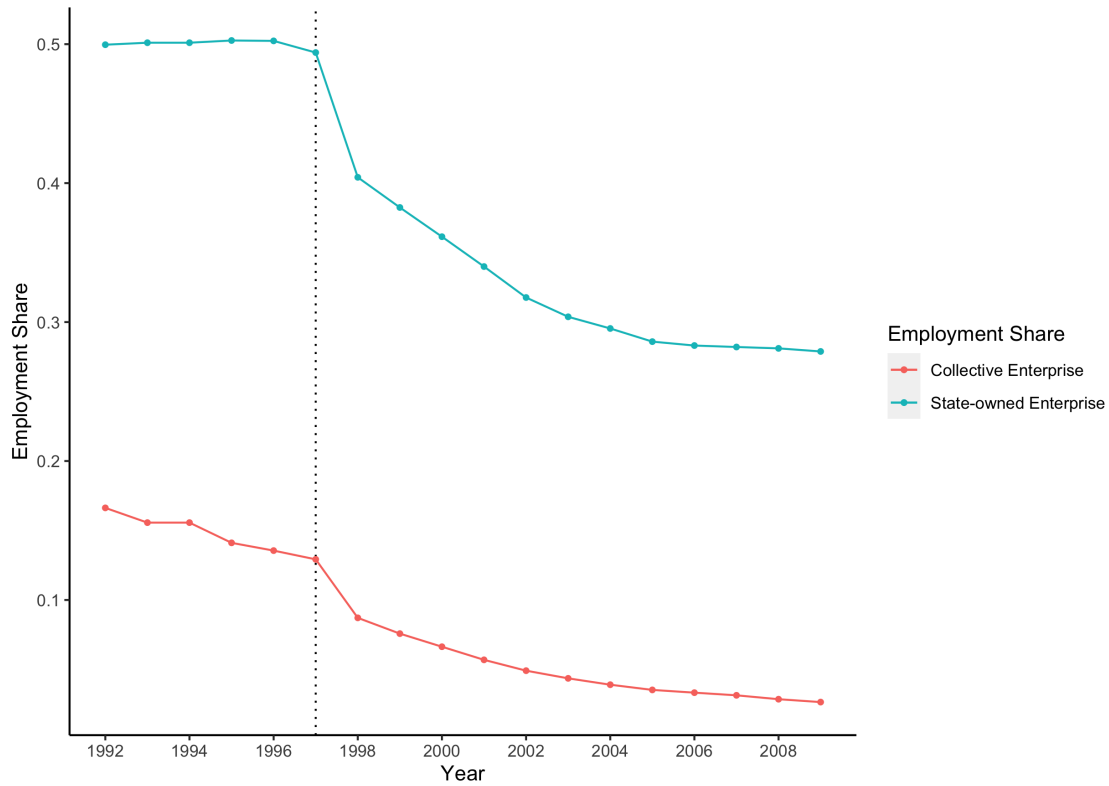
Notes: The figure reports the percent of workers that work in the SOEs from 1988 to 2013 in urban China. The nominator is the employment in each ownership (*Zhi Gong Ren Shu*), and the denominar is the 15-64 non-agriculture population from 2000 census. We add a vertical line for year 1997 when the SOE reform was officially announced by the central government. Employment data comes from China Statistic Yearbook.

Figure 2: Gender Gap in Employment and Earnings
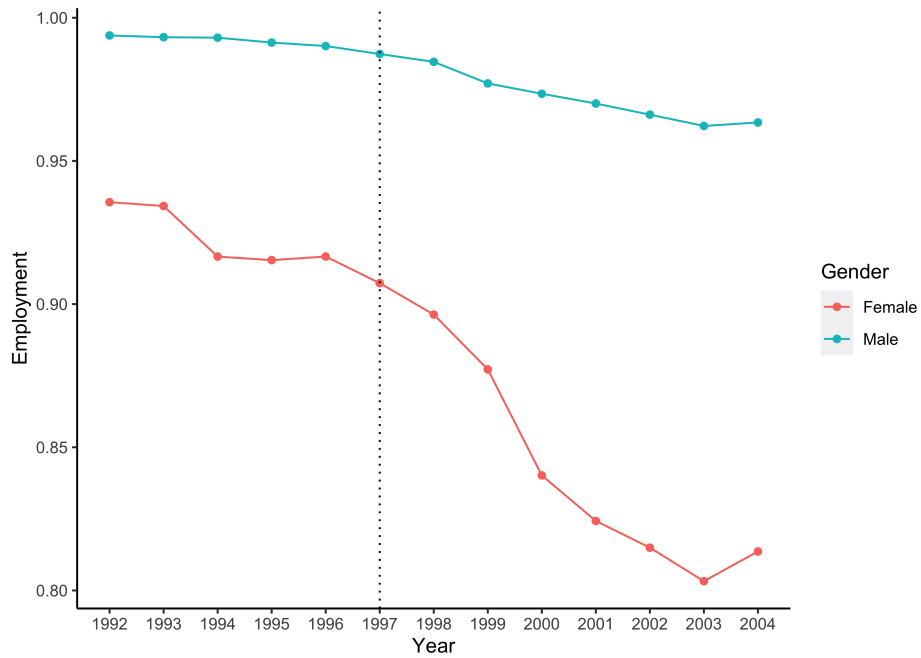
(a) Employment
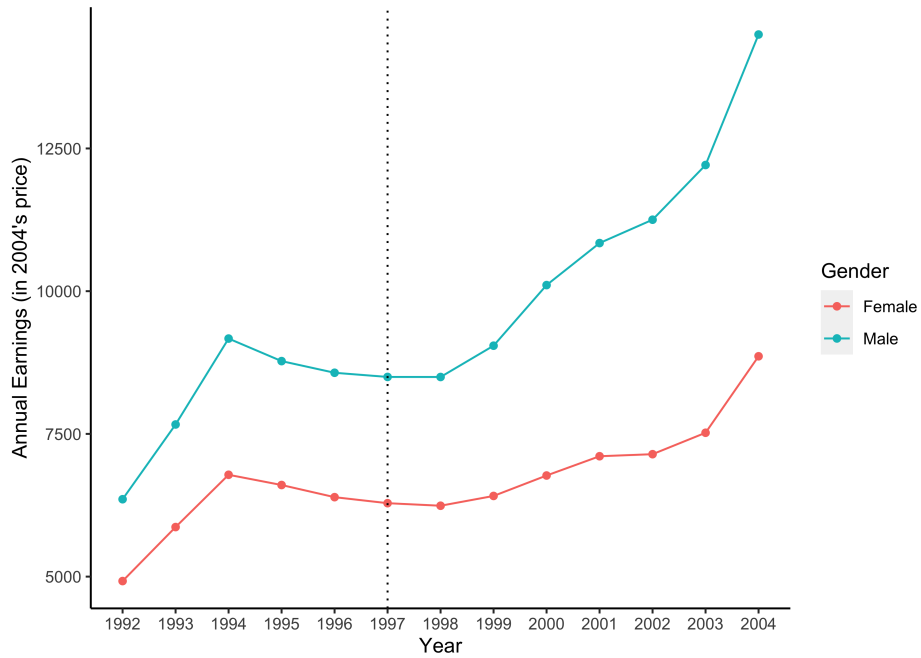
(b) Earnings

Notes: Data comes from Urban Household Survey(1992-2004). We restrict the individuals to be age 20-54 and be married. We add a vertical line for year 1997 when the SOE reform was officially announced by the central government.

Figure 3: Regional Variation in the Exposures to the Reform
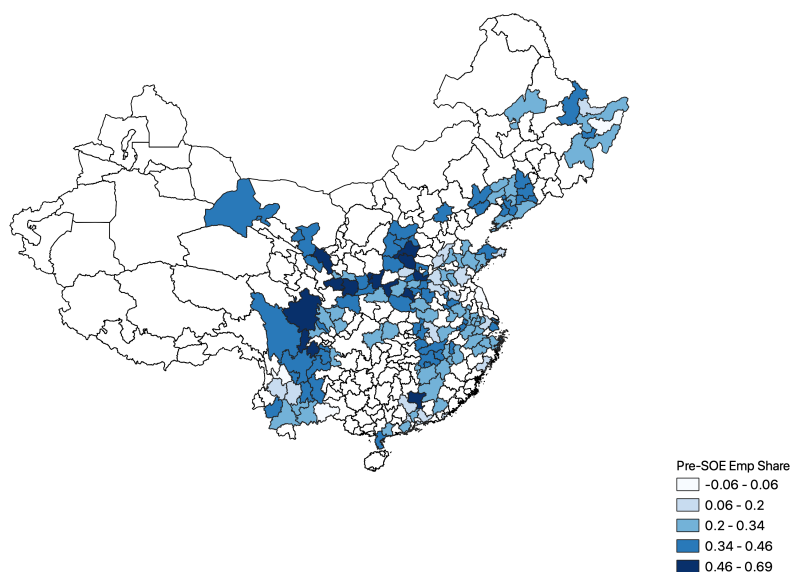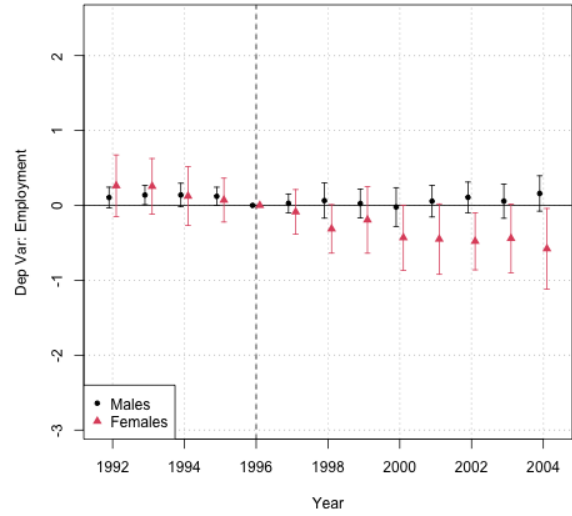

(a) SOE Employment Share in 1992
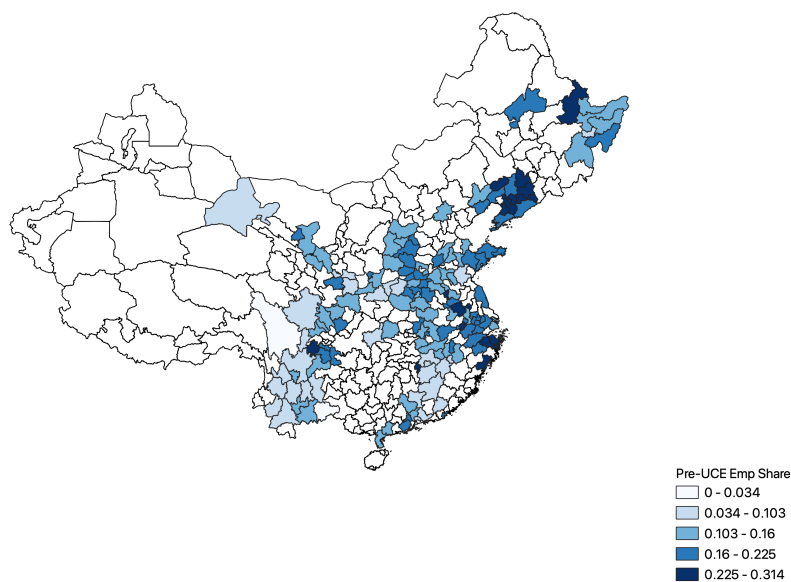
(b) UCE Employment Share in 1992

Notes: This figure reports the change of public employment share in each prefecture from 1996 to 2000. We use the employment data from the Province and City Statistical Yearbook to be the numerator. The denominator is 15-64 non-agriculture population from 2000 census. We adjust the pre-shares by the industry data from the 1990 census. A tiny proportion of the pre-SOE share is negative because of the measurement error across the multiple data sources.
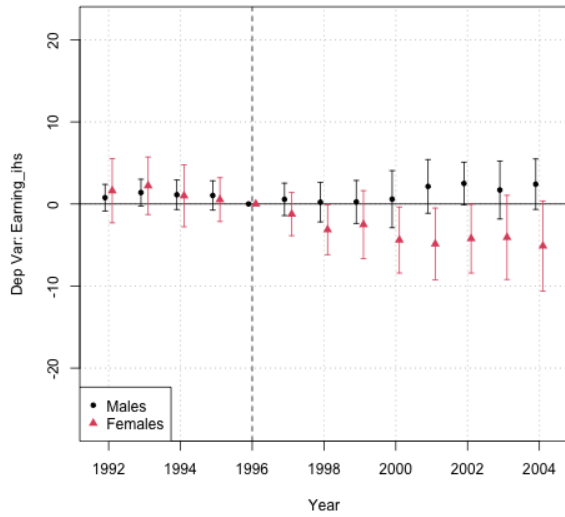
Figure 4: Event Study Results for 45-55 Age Group (coefficients of Pre-SOE Emp Share)
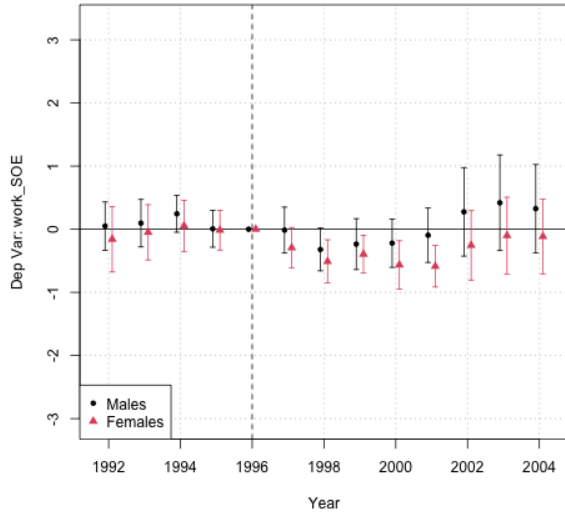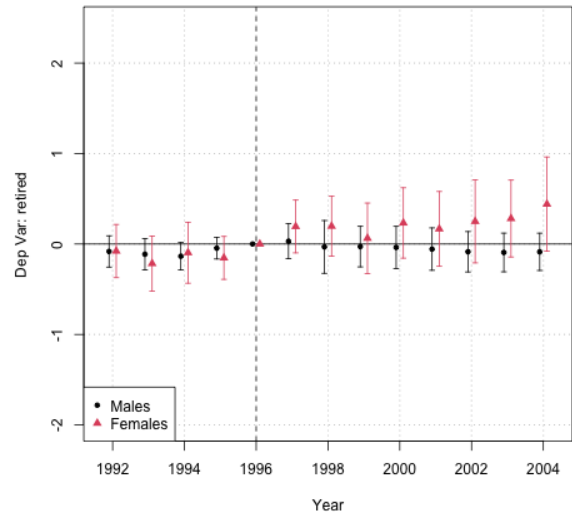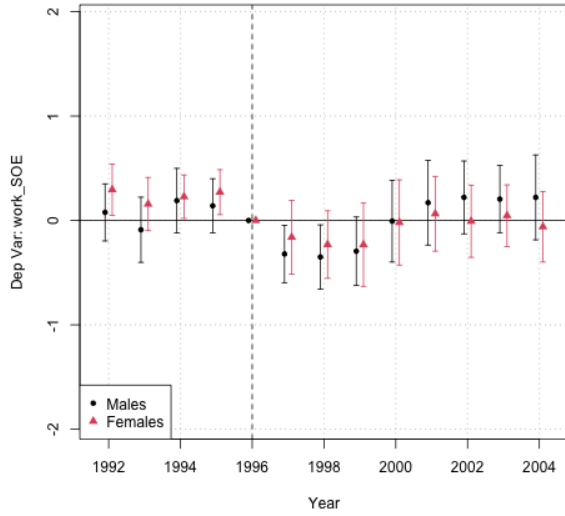

(a) SOE Employment

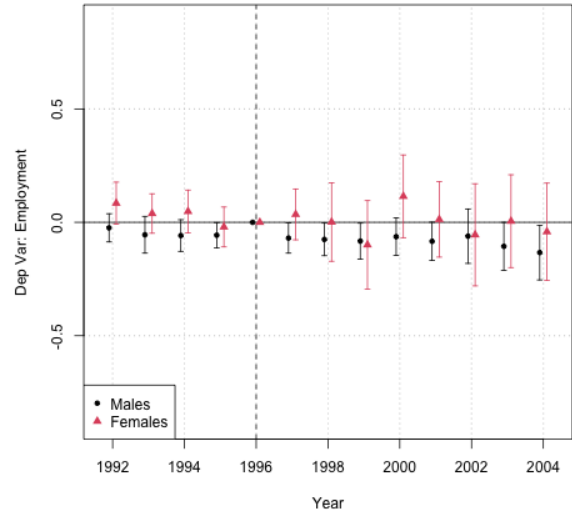(b) Employment

(c) ihs(Earnings)

(d) Early Retirement

Notes: We use the Event Study Approach to study the effect of SOE reform on employment and earnings by gender. We use the regional variation in the SOE employment share and UCE employment share in 1992 as our treatment. We include city and year fixed effect.
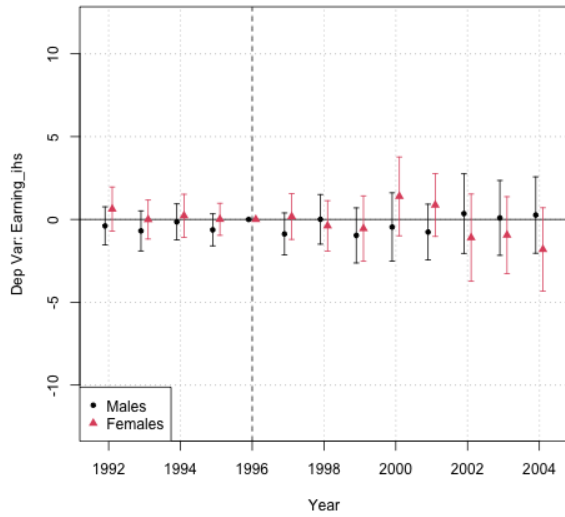
Figure 5: Event Study Results for 35-45 Age Group (coefficients of Pre-SOE Emp Share)
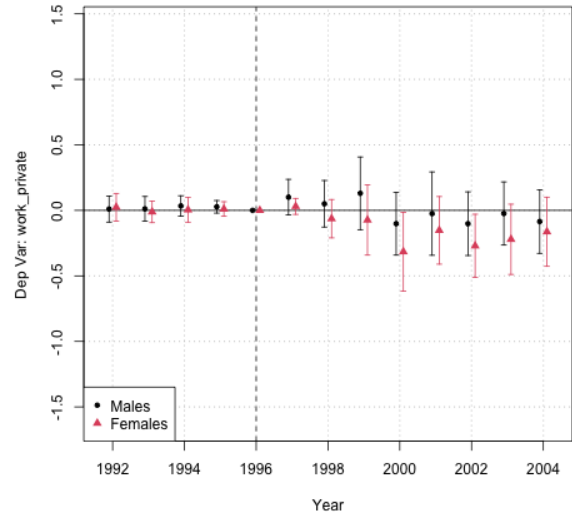

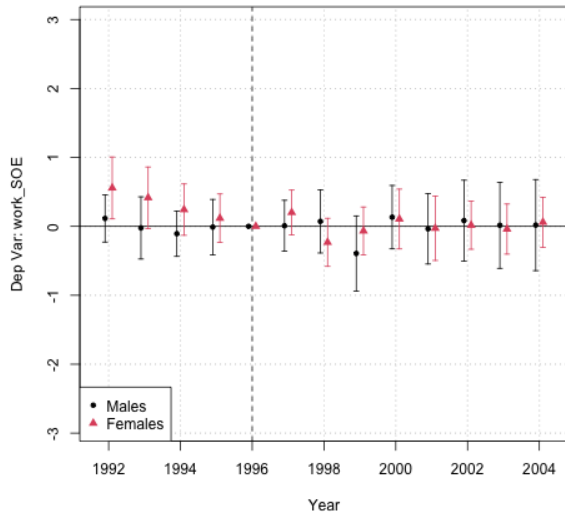(a) SOE Employment

(b) Employment

(c) ihs(Earnings)

(d) Private Employment

Notes: We use the Event Study Approach to study the effect of SOE reform on employment and earnings by gender. We use the regional variation in the SOE employment share and UCE employment share in 1992 as our treatment. We include city and year fixed effect.

Figure 6: Event Study Results for 25-35 Age Group (coefficients of Pre-SOE Emp Share)

(a) SOE Employment
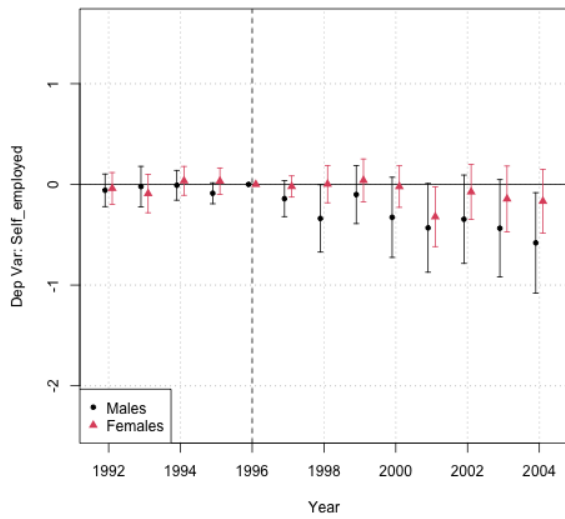
(b) Unemployment

(c) Self-Employment
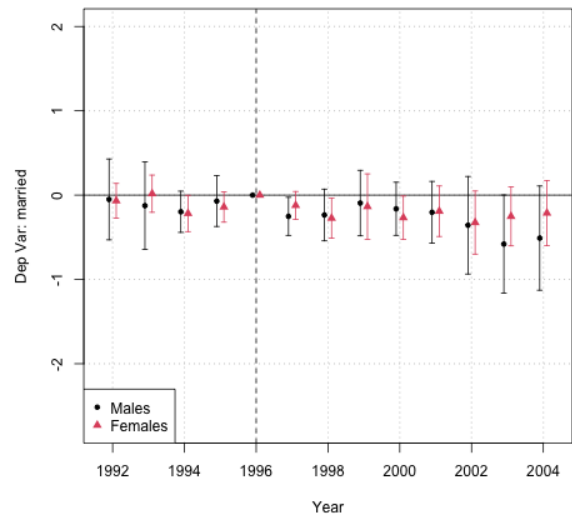
(d) Married

Notes: We use the Event Study Approach to study the effect of SOE reform on employment and earnings by gender. We use the regional variation in the SOE employment share and UCE employment share in 1992 as our treatment. We include city and year fixed effect.

Figure 7: Event Study Results for 15-25 Age Group (coefficients of Pre-SOE Emp Share)

(a) SOE Employment
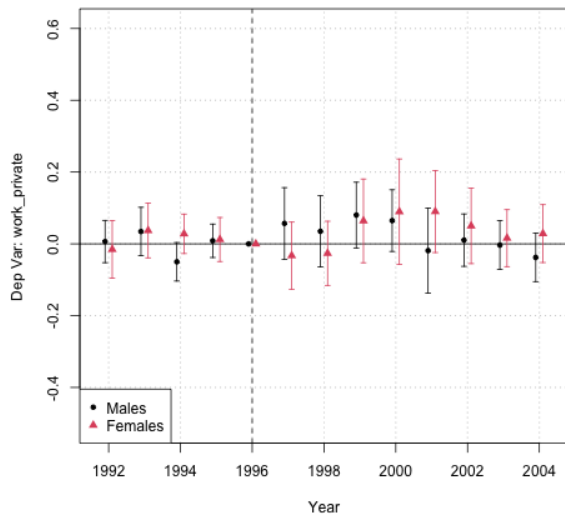
(b) Unemployment

(c) Private Employment
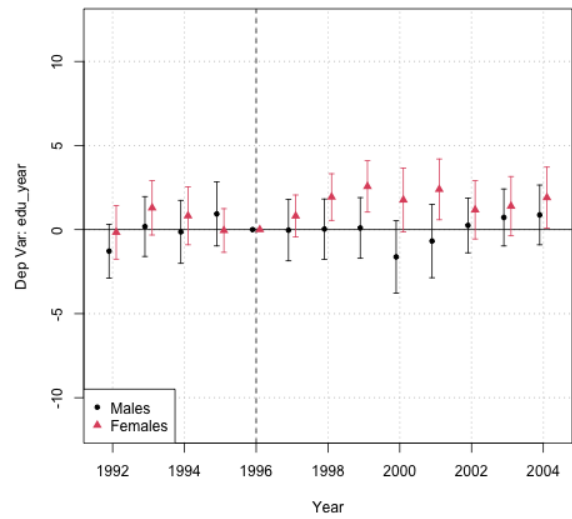
(d) Years of Education
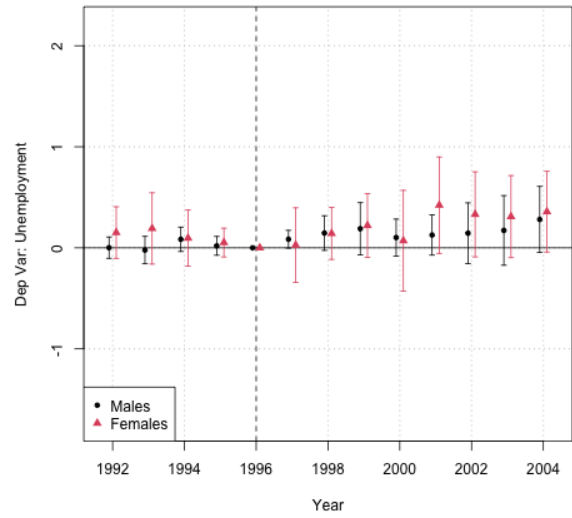
Notes: We use the Event Study Approach to study the effect of SOE reform on employment and earnings by gender. We use the regional variation in the SOE employment share and UCE employment share in 1992 as our treatment. We include city and year fixed effect.
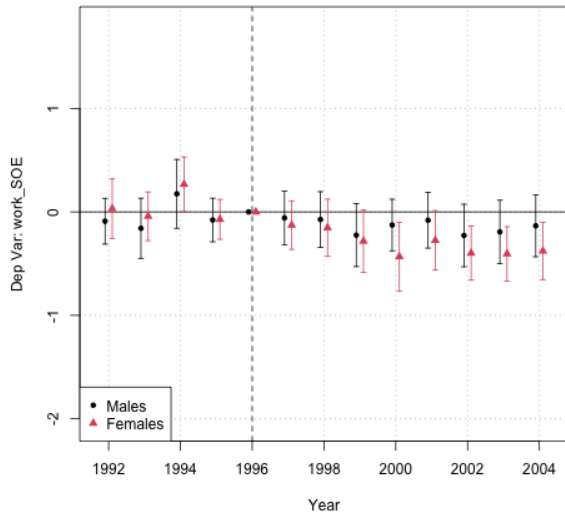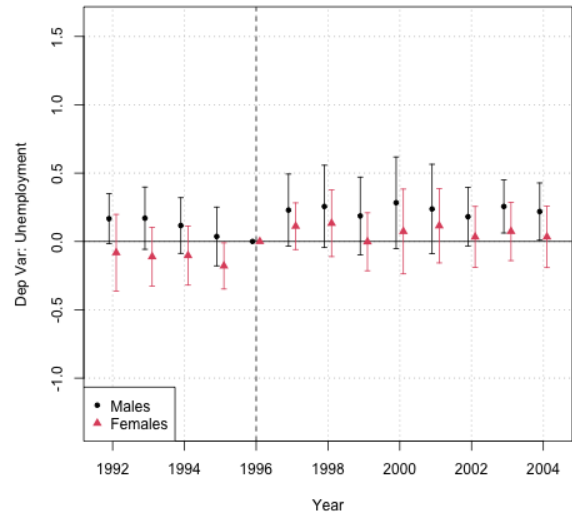
Tables

Table 1: Labor Market Outcomes: young cohort(15-25)

	Male	Female	P-value
Panel A: 1992-1996			
Unemployment	0.09	0.09	
	(0.29)	(0.28)	0.00
Work in public sector	0.25	0.25	
	(0.43)	(0.43)	0.00
Work in private sector	0.01	0.01	
	(0.11)	(0.12)	0.00
Monthly earnings (in 2004 RMB)	0.36	0.39	
	(0.48)	(0.49)	0.00
Panel B: 1997-2004			
Unemployment	0.10	0.10	
	(0.31)	(0.30)	0.00
Work in public sector	0.09	0.11	
	(0.29)	(0.31)	0.00
Work in private sector	0.03	0.04	
	(0.18)	(0.19)	0.00
Monthly earnings (in 2004 RMB)	0.19	0.23	
	(0.40)	(0.42)	0.00
Observations	18497	48097	

Note: Weighted means and standard deviations are presented. Individuals are between age 15 and 25. Data comes from Urban Household Survey (1992-2004). Our sample includes 201 prefectures.

Table 2: Labor Market Outcomes: young cohort(25-35)

	Male	Female	P-value
Panel A: 1992-1996			
Unemployment	0.01	0.02	
	(0.12)	(0.15)	0.00
Work in public sector	0.79	0.64	
	(0.41)	(0.48)	0.00
Self-employment	0.03	0.03	
	(0.17)	(0.16)	0.06
Monthly earnings (in 2004 RMB)	0.97	0.95	
	(0.17)	(0.22)	0.00
Panel B: 1997-2004			
Unemployment	0.08	0.12	
	(0.28)	(0.33)	0.00
Work in public sector	0.57	0.47	
	(0.49)	(0.50)	0.00
Self-employment	0.16	0.15	
	(0.37)	(0.36)	0.06
Monthly earnings (in 2004 RMB)	0.86	0.80	
	(0.34)	(0.40)	0.00
Observations	18810	48614	

Note: Weighted means and standard deviations are presented. Individuals are between age 25 and 35. Data comes from Urban Household Survey (1992-2004). Our sample includes 201 prefectures.

Table 3: Labor Market Outcomes: prime cohort(35-45)

	Male	Female	P-value
Panel A: 1992-1996			
Employment	0.99	0.97	
	(0.07)	(0.17)	0.00
Work in public sector	0.79	0.62	
	(0.40)	(0.49)	0.00
Work in private sector	0.01	0.01	
	(0.11)	(0.09)	0.00
Monthly earnings (in 2004 RMB)	0.98	0.96	
	(0.13)	(0.20)	0.00
Panel B: 1997-2004			
Employment	0.97	0.88	
	(0.16)	(0.32)	0.00
Work in public sector	0.65	0.49	
	(0.48)	(0.50)	0.00
Work in private sector	0.08	0.07	
	(0.27)	(0.25)	0.00
Monthly earnings (in 2004 RMB)	0.91	0.83	
	(0.28)	(0.37)	0.00
Observations	26674	74139	

Note: Weighted means and standard deviations are presented. Individuals are between age 35 and 45. Data comes from Urban Household Survey (1992-2004). Our sample includes 201 prefectures.

Table 4: Labor Market Outcomes: old cohort(45-55)

	Male	Female	P-value
Panel A: 1992-1996			
Employment	0.96	0.68	
	(0.20)	(0.47)	0.00
Work in public sector	0.78	0.35	
	(0.41)	(0.48)	0.00
Early retirement	0.07	0.32	
	(0.25)	(0.47)	0.00
Monthly earnings (in 2004 RMB)	0.95	0.67	
	(0.22)	(0.47)	0.00
Panel B: 1997-2004			
Employment	0.90	0.58	
	(0.30)	(0.49)	0.00
Work in public sector	0.58	0.24	
	(0.49)	(0.43)	0.00
Early retirement	0.10	0.39	
	(0.30)	(0.49)	0.00
Monthly earnings (in 2004 RMB)	0.86	0.56	
	(0.35)	(0.50)	0.00
Observations	16052	65908	

Note: Weighted means and standard deviations are presented. Individuals are between age 45 and 54. Data comes from Urban Household Survey (1992-2004). Our sample includes 201 prefectures.

Table 5: Effect of SOE reform on gender inequality, 45-55

	All	Men	Women	All	Men	Women
Panel A		Work in SOE			Employment	
Pre-SOE emp share × after	0.134	-0.041	-0.247**	-0.075	-0.090	-0.458***
	(0.168)	(0.168)	(0.124)	(0.083)	(0.066)	(0.114)
Female × Pre-SOE emp share × after	-0.501***			-0.401***		
	(0.151)			(0.123)		
Panel B		Earnings(IHS)			Early retirement	
Pre-SOE emp share × after	-0.002	-0.018	-0.412***	0.096	0.061	0.277**
	(0.092)	(0.081)	(0.125)	(0.084)	(0.075)	(0.122)
Female × Pre-SOE emp share × after	-0.428***			0.148		
	(0.129)			(0.121)		
N	85805	42679	43126	85805	42679	43126

Notes: Column (1) also includes Pre-UCE emp share × after; column (2) and column (3) include Pre-UCE emp share × after. All regressions include age dummies, education group dummies, year fixed effects, and prefecture fixed effects. Robust standard errors are clustered at the prefecture level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 6: Effect of SOE reform on gender inequality, 35-45

	All	Men	Women		All	Men	Women
Panel A		Work in SOE				Employment	
Pre-SOE emp share × after	-0.064	-0.119	-0.169		-0.038	-0.042*	-0.017
	(0.141)	(0.144)	(0.112)		(0.033)	(0.023)	(0.051)
Female × Pre-SOE emp share × after	-0.142				0.028		
	(0.153)				(0.047)		
Panel B		Earnings(IHS)				Private employment	
Pre-SOE emp share × after	0.034	0.026	-0.012		-0.062	-0.024	-0.165*
	(0.059)	(0.052)	(0.068)		(0.107)	(0.112)	(0.099)
Female × Pre-SOE emp share × after	-0.042				-0.070*		
	(0.053)				(0.041)		
N	101719	44985	47754		92739	44985	47754

Notes: Column (1) also includes Pre-UCE emp share × after; column (2) and column (3) include Pre-UCE emp share × after. All regressions include age dummies, education group dummies, year fixed effects, and prefecture fixed effects. Robust standard errors are clustered at the prefecture level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 7: Effect of SOE reform on gender inequality, 25-35

	All	Men	Women		All	Men	Women
Panel A		Work in SOE				Unemployment	
Pre-SOE emp share × after	-0.049	-0.051	-0.271**		0.077	0.120*	0.136
	(0.185)	(0.184)	(0.116)		(0.077)	(0.072)	(0.105)
Female × Pre SOE emp share × after	-0.226				0.106		
	(0.195)				(0.096)		
Panel B		Self-employment				Married	
Pre-SOE emp share × after	-0.223	-0.279*	-0.059		-0.163	-0.131	-0.118**
	(0.136)	(0.156)	(0.099)		(0.114)	(0.115)	(0.059)
Female × Pre SOE emp share × after	0.118*				0.050		
	(0.068)				(0.079)		
N	66711	27316	31243		58559	27316	31243

Notes: Column (1) also includes Pre-UCE emp share × after; column (2) and column (3) include Pre-UCE emp share × after. All regressions include age dummies, education group dummies, year fixed effects, and prefecture fixed effects. Robust standard errors are clustered at the prefecture level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 8: Effect of SOE reform on gender inequality, 15-25

	All	Men	Women	All	Men	Women
Panel A		Work in SOE			Unemployment	
Pre-SOE emp share × after	-0.115	-0.101	-0.306***	0.163*	0.140	0.209***
	(0.072)	(0.078)	(0.074)	(0.089)	(0.087)	(0.060)
Female × Pre SOE emp share × after	-0.175***			0.040		
	(0.064)			(0.068)		
Panel B		Private employment			Years of education	
Pre-SOE emp share × after	0.024	0.026	0.021	0.225	0.097	1.358***
	(0.030)	(0.026)	(0.027)	(0.500)	(0.484)	(0.498)
Female × Pre SOE emp share × after	0.006			1.066**		
	(0.029)			(0.520)		
N	61747	28642	28481	57120	28640	28480

Notes: Column (1) also includes Pre-UCE emp share × after; column (2) and column (3) include Pre-UCE emp share × after. All regressions include age dummies, education group dummies, year fixed effects, and prefecture fixed effects. Robust standard errors are clustered at the prefecture level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 9: Hetergeneous effects of SOE reform on gender inequality (45-55), by education attainment

	Less than high school	High school	Above high school	Less than high school	High school	Above high school
Panel A		Work in SOE			Employment	
Female × Pre-SOE emp share × after	-0.294	-0.361	-0.742***	-0.362**	-0.128	-0.415***
	(0.219)	(0.313)	(0.202)	(0.166)	(0.212)	(0.143)
Female × after	0.195**	0.208	0.231***	0.065	0.058	0.062
	(0.091)	(0.141)	(0.081)	(0.080)	(0.114)	(0.065)
Female	-0.441***	-0.387***	-0.379***	-0.426***	-0.257**	-0.161***
	(0.083)	(0.136)	(0.069)	(0.082)	(0.100)	(0.058)
Panel B		Earnings (IHS)			Early retirement	
Female × Pre-SOE emp share × after	-0.376**	-0.242	-0.419***	-0.132	0.163	0.555***
	(0.173)	(0.193)	(0.146)	(0.167)	(0.227)	(0.158)
Female × after	0.074	0.129	0.073	0.138*	-0.109	-0.121*
	(0.083)	(0.109)	(0.063)	(0.081)	(0.119)	(0.070)
Female	-0.393***	-0.291***	-0.159***	0.121	0.285**	0.288***
	(0.087)	(0.097)	(0.059)	(0.091)	(0.113)	(0.057)
N	42043	17890	25872	42043	17890	25872

Notes: All regressions include Pre-UCE emp share × after, age dummies, education group dummies, year fixed effects, and prefecture fixed effects.

Robust standard errors are clustered at the prefecture level. * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 10: Hetergeneous effects of SOE reform on gender inequality (45-55), by children in the HH

	Children under age 13	No children under age 13	Children under age 13	No children under age 13
Panel A	Work in SOE		Employment	
Female × Pre-SOE emp share × after	-0.738	-0.463**	-1.328***	-0.390***
	(0.509)	(0.185)	(0.376)	(0.147)
Female × after	0.473**	0.214***	0.677***	0.077
	(0.239)	(0.078)	(0.213)	(0.069)
Female	-0.793***	-0.481***	-0.832***	-0.367***
	(0.251)	(0.076)	(0.197)	(0.072)
Panel B	Earnings (IHS)		Early retirement	
Female × Pre-SOE emp share × after	-1.336***	-0.415***	0.740*	0.099
	(0.384)	(0.152)	(0.402)	(0.131)
Female × after	0.679***	0.090	-0.396*	0.028
	(0.215)	(0.071)	(0.204)	(0.064)
Female	-0.829***	-0.358***	0.514**	0.201***
	(0.208)	(0.072)	(0.198)	(0.076)
N	3342	82463	3342	82463

Notes: All regressions include Pre-UCE emp share × after, age dummies, education group dummies, year fixed effects, and prefecture fixed effects.

Robust standard errors are clustered at the prefecture level. * significant at 10%, ** significant at 5%, *** significant at 1%.

43

Table 11: Test the Industry and Discrimination Channel

	All Prefectures		Balanced Prefectures	
	Δ Female Index	Δ Discrimination Index	Δ Female Index	Δ Discrimination Index
Pre-SOE Emp Share	-0.0602*	-929.0	-0.114**	46721.6
	(0.0354)	(24162.5)	(0.0486)	(57815.8)
Pre-UCE Emp Share	0.0258	-29471.2	-0.0450	-26361.5
	(0.0725)	(33348.8)	(0.104)	(41782.2)
Observations	157	155	63	62

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: The change of female Index represents the change of historically female-dominated industries for each prefecture. The change of discrimination index represents the the change of industries that becomes more gender discriminate after the reform for each prefecture. * significant at 10%, ** significant at 5%, *** significant at 1%.

Appendix

Appendix A   Data: Weight

A.1   Weight by Ownership Type

As Ge and Yang (2014) mentioned in their paper, UHS is known for overweighting of the SOE workers. They mentioned three potential reasons for this. First, self-reporting may introduce error. For example, when a SOE is restructured and becomes a stock-holding firm or a joint venture, its employees may continue to classify their employer as a SOE, failing to recognize the change in ownership for some time. Second, SOE workers usually work a regular eight-hour day, and thus may have more free time in which to respond to surveys than their private-sector counterparts. Third, the China National Bureau of Statistics (CNBS) seeks help from employers to persuade workers to participate in the surveys to reduce the nonresponse rate.

We examine the trend of public employment share (including both government, SOE[A1], and collective employmet) for each prefecture from the UHS data and present the results. While we observe a sharp decline in public employment share for most cities during the reform period of 1996-2000, we also find abnormalities in some cities, such as those in Henan and Hubei, two provinces that have been most affected by the reform according to previous literature (Lee, 2000). We provide the comparision of the public employment share of Henan across the Statistical Yearbook data and the UHS data in Figure A1. Interestingly, the UHS data shows a steady or even increasing trend of public sector employment in these cities, providing evidence of a sampling issue in the UHS data.

We also refer to other data sources to confirm the problem.

First, we examine the trend of public employment share using data from the statistical yearbook of each prefecture. The statistical yearbook is an authoritative source of economic indicators coded by the statistical bureau of each prefecture. Figure 1 shows the trend of public employment share in most cities, indicating a sharp decrease during the reform period of 1996 to 2000. Furthermore, we note that the most significant declines occurred in 1998, the year following the national announcement in 1997. By comparing the public employment share data from the UHS and the statistical yearbook, we find a significant discrepancy, further implying a sampling issue in the UHS data.

Next, we refer to the China Labor Statistical Yearbook coded by CNBS. It provides data at the provincial level. In Figure **??**, we display two data sources: the share of SOE sector layoffs for

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[A1]We are not able to separte government and SOE employment from our data source, Statistical Yearbook of each province and city.

each province from 1998 to 2000 and the change in public employment share for each province from 1996 to 2000. Both graphs are consistent with the treatment intensity proxy as described above.

Based on the evidence presented above, we conclude that there is a need to address the representativeness issue in the UHS data. To achieve this, we propose adjusting the weight of each observation. While Ge and Yang (2014) utilize a resampling approach to address this issue, we propose reweighting the employment by ownership type to make more efficient use of the UHS data.

We compare the shares of different types of employment (namely SOE employment, collective employment, and other employment) between the statistical yearbook and the UHS for each prefecture-year. for each prefecture-year. We define the the variable $Weight\_emp_{ict}$ in Equation A1.

$$
Weight\_emp_{ict} =
\begin{cases}
\dfrac{SOEShare_{yearbook}}{SOEShare_{UHS}} & \text{For Gov \& SOE workers i} \\[2ex]
\dfrac{CollectiveShare_{yearbook}}{CollectiveShare_{UHS}} & \text{For Collective workers i} \\[2ex]
\dfrac{1 - PublicShare_{yearbook}}{1 - PublicShare_{UHS}} & \text{For nonpublic (non-Gov \& SOE and Collective) workers i}
\end{cases}
\tag{A1}
$$

A.2 Weight by Year

Another notable issue with the UHS dataset is the tripled sample size following the 2002 reform, which creates a need to downweight observations after 2002 to account for the potential bias in the data. To address this issue, we create a new variable $Weight\_year_{ict}$ that measures the change in population before and after the reform in each prefecture. By comparing the mean population before and after 2002, we calculate a weight ratio that is applied to adjust for the year-level discrepancy, as presented in Equation A2. As noted by Dai et al. (2021), the UHS sample size for each prefecture is proportionate to their population, so we don't need to weight the sample according to the population.

$$
Weight\_year_{ict} =
\begin{cases}
1 & t < 2002 \\[1ex]
\dfrac{AverageSampleSizeBefore2002_{ict}}{AverageSampleSizeAfter2002_{ict}} & t \geq 2002
\end{cases}
\tag{A2}
$$

We multiply the two weights and use as our weighting index $Weight_{ict}$, as shown in Equation A3.

$$
Weight_{ict} = Weight\_emp_{ict} \times Weight\_year_{ict}
\tag{A3}
$$

Figure A1: Compare the Public Employment Share Trend in Henan across UHS and Statistical Yearnbook

Public Employment Share from the Statistical Yearbook Data

(a) Data from Statistical Yearbook
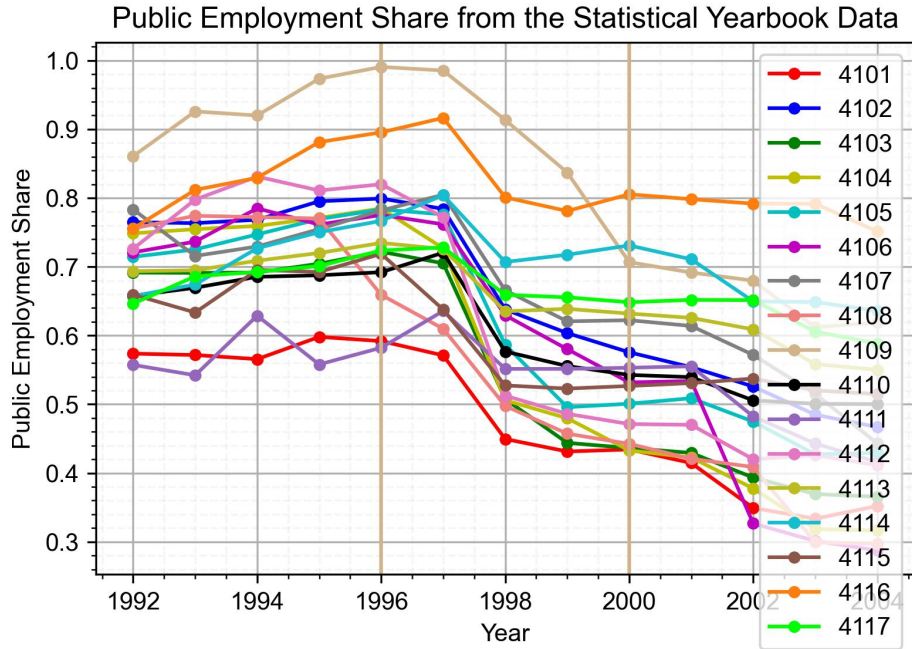
Public Employment Share from the UHS Data
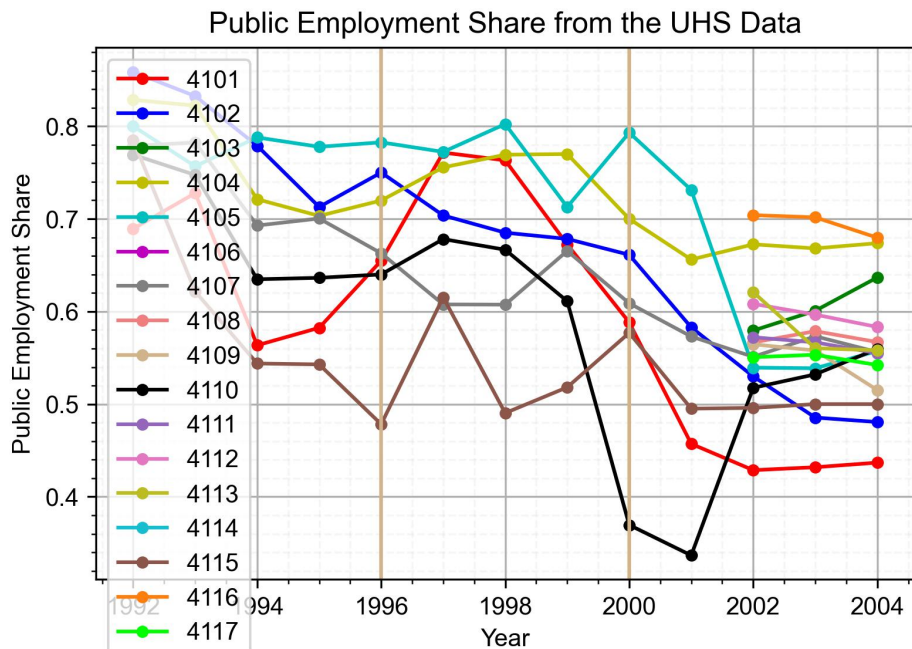
(b) Data from UHS

Notes: The legend represents each city code from Henan. Some cities in Henan only show up after 2002 in the UHS. Public employment includes government, SOE, and collective enterprise. We divde the public employment by non-agriculture population for age 15-64.

A.3 Verify the Weighting Approach using the *Reduction in Public Employ-ment*

Whether our weight approach is valid? To answer this question, we conduct an event study to correlate the reform intensity with the individual's probability of working in the public sector. If our measurement of reform intensity is reliable, which relies on the data that comes from the statistical yearbook, the point estimate should be around -1 in year 2000. The reason is simple. Mechanically, if the change in public employment share went from 100% in 1996 to 0 in 2000, we should observe that the probability for any workers to work for any public sector is 0. In other words, as the outcome variable *Work in Public Sector* is a stock variable, a coefficient of -1 at year 2000 implies that public employment has completely diminished compared to the base year 1996.

The specific event study regression design is as follows:

$$Work\ in\ Public\ Sector_{ipt} = \alpha + \sum_{k \geq 1992, k \neq 1996}^{2004} \beta_k \times ReformIntensity_p \times \mathbb{1}\{t == k\} + \Phi X_{ipt} + \delta_p + \gamma_t + \varepsilon_{ipt}$$

(A4)

We present a comparison between the event study with and without our weighting approach, as illustrated in Figure A2. Our findings indicate that without the use of weighting, the coefficient at year 2000 is -0.2. This suggests that the UHS data fails to accurately capture the public sector employment reported by the statistical yearbook data. The reason for this disparity is that certain cities oversample SOE employees, thereby failing to reflect the contracting public sector, as detailed in Section A. In contrast, when we apply our weighting strategy, the coefficient at year 2000 is -1. This confirms the mechanical accuracy of our weighting approach and provides evidence that it successfully addresses UHS's sampling issue. Therefore, we use our weighting strategy for all analyses in this paper.

Appendix B   Data: Marriage Outcome Inference

The UHS doesn't provide outcomes on marriage status before 2002, so we infer this information according to the each person's relationship with the household lead. We outline the algorithm as below.

We first classify household members into three generations, the household lead generation, the parent generation, and the children generation. Couples can show up in all of the three generations. For the household generation, we assume the household is married if and only if his/her spouse appears in the survey. For the parents' generation, we assume the member is married if and only if we observe one female and one male in the generation. Inference is harder for the children's gener-

Figure A2: Validity of the Weighting Approach: Effect on Employment in the Public Sector
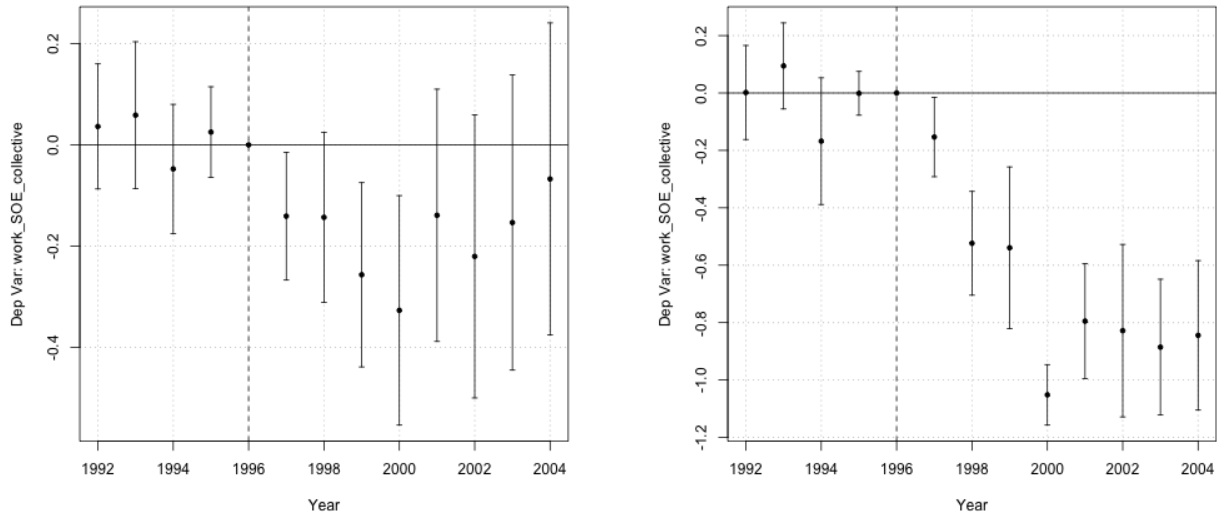
(a) Without Weighting and Control Variables

(b) Without Control Variables

Table A1: Error Rate in the Inferred Marriage Status

Age	Unmarried inferred as married	Married inferred as unmarried	Total
21	0.9365%	1.93%	2.873 %
22	0.8391%	1.966%	2.805%
23	0.7016%	2.036%	2.737 %
24	0.5658%	2.152%	2.718%
25	0.369%	2.35%	2.754%
26	0.2787%	2.65%	2.93%

ation as we can't distinguish sibling or couple according to the survey question. We make a strong assumption that if only one male and one female above 24 appear in the children's generation, they are married couple.

We acknowledge that we can make both Type I (married inferred as unmarried)and Type II (unmarried inferred as married) error in our inference. In order to check the error rate, we compare the inferred status and the true status provided in the survey after 2002. We provide the error rate in Table A1. We find that the error is the lowest when we assume the age limit to be 24 for the younger generation. The total error rate is as low as 2.7%, making our analysis more credible.

Appendix C Validate the Exposures

Reduction in the Public Sector Employment To validate our two reform exposures, we take advantage of the key feature of the SOE reform, which resulted in a massive layoff that varies across regions. Ideally, we would like to know the exact number of laid-off workers across ownerships in each year by regions, however, such data is not available. Instead, we utilize the reduction in the regional public employment share from 1996 to 2000 to validate our two pre-reform exposures. To be specific, the *Reduction in Public Employment* is calculated as shown in Equation A5.

$$\text{Reduction in Public Employment}_p = \frac{\text{Public Employment}_{p,1996}}{\text{Working-age Population}} - \frac{\text{Public Employment}_{p,2000}}{\text{Working-age Population}}$$
(A5)

Figure 3 and A4 show the regional variations in pre-SOE share, pre-UCE share and the *Reduction in Public Employment*. We observe significant variations in all these three measures. For example, the northeast of China experienced a sharp decline in the employment in the public sectors during the reform. And these are the areas with high pre-SOEs and pre-UCEs employment shares.

Do Pre-shares really predict the *Reduction in Public Employment*? In this part, we validate that both the pre-SOE share and pre-UCE share are positively correlated with the *Reduction in Public Employment*.

For this analysis, we utilize the full sample of prefectures, regardless of whether they appear in each year of the UHS. Our primary focus is on the pre-reform employment shares of different types of public ownership, such as government, SOEs, and UCEs. We hypothesized that prefectures with higher pre-reform SOE and UCE shares would be more impacted by the reform. The construction of the pre-shares has been discussed in Section 4.

The hypothesis is that the pre-reform employment share by ownership may predict the reform intensity. It is true that we find that both SOE and UCE share in 1992 positively predict the *Reduction in Public Employment*, as shown in Figure A5. This implies that a higher pre-reform public employment share is positively correlated with the reductions in the public sector. Moreover, we have found that the coefficient of collective enterprise employment share is higher than that of SOE. This finding could be explained by two potential reasons. First, although we observe the biggest decline in employment numbers in the SOE sector, the UCE sector shrank more proportionately during the reform. Hence, this could contribute to a higher coefficient of the collective enterprise in our analysis. Second, UCEs are impacted more during the reform. As discussed as in Section 2, while SOE are mostly big enterprises, collective enterprises are much smaller. Following the

50

guidance of *zhuada fangxiao* ("grasping the big, enlivening the small"), collective enterprises are more likely to be shut down or privatized than SOEs.

Do pre-shares by industry predict the *Reduction in Public Employment*? We further ask whether the pre-reform shares by industry can be good proxies to the reform. This hypothesis relies on the assumption that the reform affects certain industries more than others. Indeed, we discover from the China Labor Statistical Yearbook that the manufacturing and wholesale and restaurant industries experienced the most significant declines during the reform period. We want to determine whether the *Reduction in Public Employment* varies based on the pre-reform employment share in different industries. We use the 1990 census to calculate the employment share by industry. We classified the industries into 13 categories using the 2-digit classification system from the 1990 census. However, when we regress the *Reduction in Public Employment* on these pre-shares by industry, none of them is significant, as shown in Figure A5. It means that although the reform indeed targets on certain industries, the *Reduction in Public Employment* is not correlated with the composition of these industries prior to the reform.[A2] As a result, the pre-reform shares by industry can't be a valid proxy to the reform.

Do pre-determined characteristics correlate with the pre-shares? We leverage the variation in pre-reform SOE share and UCE share as our identification strategy. In this part, we discuss the correlations of other observables with the two pre-share variables.

In an ideal scenario, we would expect the pre-reform industry shares to be as good as random. However, this is unlikely to be true in reality. In fact, the SOE reform began in the 1980s, with a focus on property rights, while the labor market remained rigid. Moreover, under the guidance of Deng Xiaoping, China aimed to gradually open up the country to foreign investment and trade. In general, we believe that regions with a more open local economy tend to have a lower share of public employment.

We regress the pre-reform shares on some prefecture economic indicators. We summarize the results in Table A4. We are interested in the explanatory variables *FDI/GDP*, *GDP per capita*, *Finance Income per GDP*, *Finance Expense per GDP*, *GDP Share in Seconday Industry*, and *GDP Share in Tertiary Industry*. We believe they are the indicators for economy opennes. The data used in this analysis was sourced from the City Statistical Yearbook. While it remains the only available source, it should be noted that it suffers from the issue of missing data. Despite this limitation, we believe that the available data still provides valuable insights for our analysis.

Table A4 includes two samples: one that encompasses all prefectures, and another that excludes

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[A2]Since we only have 13 industry categories, our prediction has to be relied on this relatively coarse division. If there were more detailed categories, things may change.

those within Guangdong province. Guangdong has traditionally been at the forefront of China's economic reforms, with its prefectures being particularly impacted by the economy reform prior to the SOE reform in the 1990s. In the full sample, we observe a negative correlation between *FDI/GDP* and *GDP per capita* with both *Pre-SOE Emp Share* and *Pre-UCE Emp Share*. This suggests that more prosperous economies tend to have a smaller public employment share within a prefecture. However, this correlation loses significance in the sample that excludes Guangdong.

While it may be difficult to dispute the exclusion restriction for two of the pre-share variables, we aim for our instruments to primarily operate through the SOE reform of the 1990s. As a result, we exclude prefectures within Guangdong from our baseline analysis.

Appendix D   Other Figures and Tables

Table A2: SOE and UCE Employment Share in Each Industry

	SOE	UCE
Farming, forestry, animal husbandry and fishery	0.959	0.035
Mining	0.914	0.081
Manufacturing	0.608	0.254
Production and supply of electric power, gas and water	0.919	0.039
Construction	0.574	0.398
Geologic examination	0.983	0.016
Traffic, storage and mail business	0.824	0.162
Wholesale and retail trade	0.584	0.369
Finance	0.722	0.252
Real estate	0.771	0.089
Social welfare	0.717	0.187
Health, sports, social welfare	0.865	0.134
Education	0.983	0.016
Scientific research	0.939	0.042
Public administration and social organization	0.994	0.007
Other	0.723	0.263

Notes: Data source: China Labor Statistics Yearbook of 1992. This table shows the SOE and CE employment share in each industry. SOE stands for State-owned Enterprise and UCE stands for Urban Collective Enterprise.

Figure A3: Gender Gap Trend in China and the U.S.
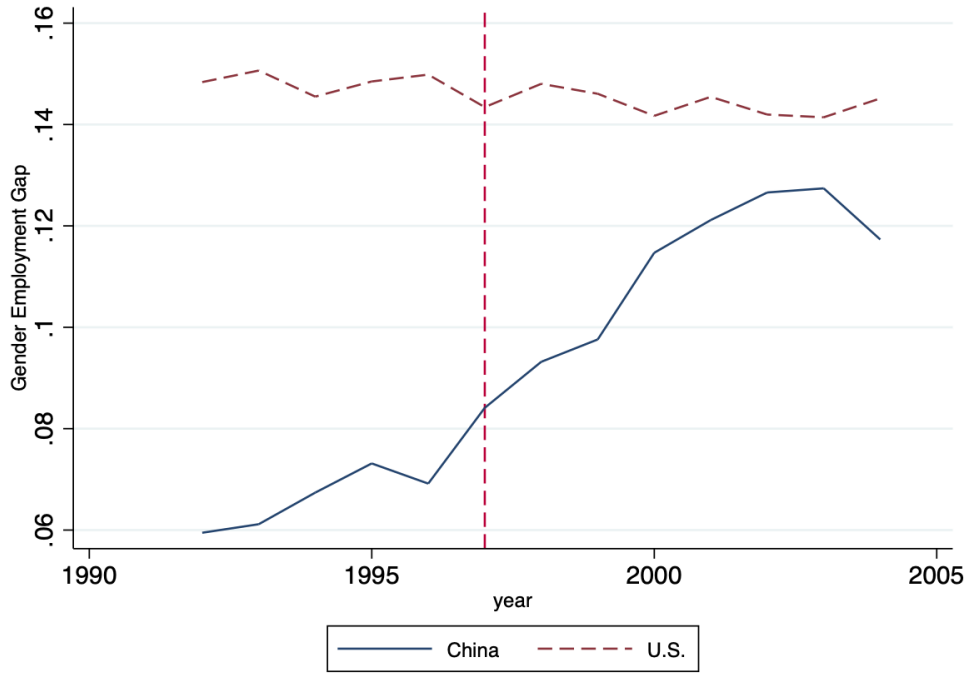
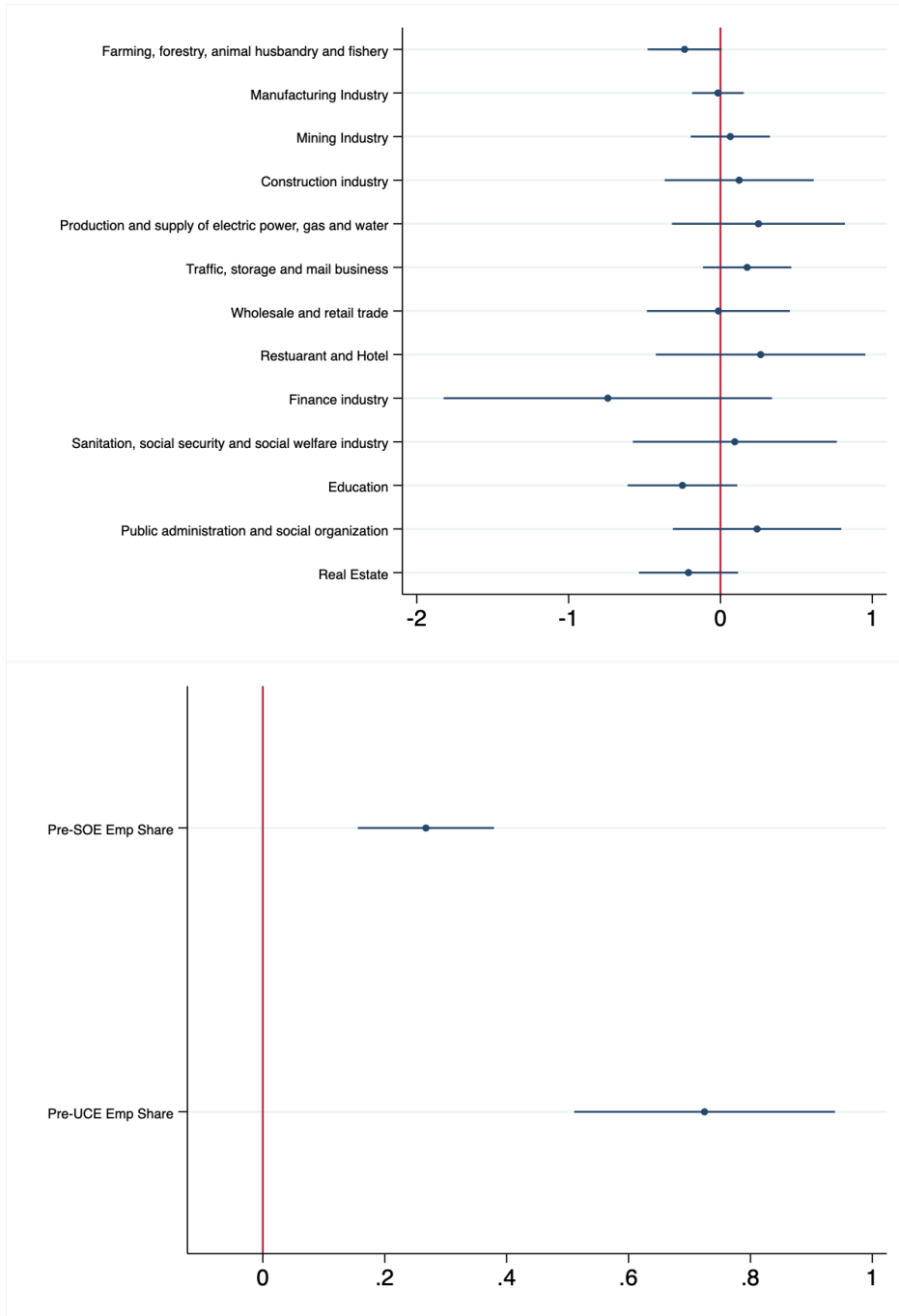

(a) Employment
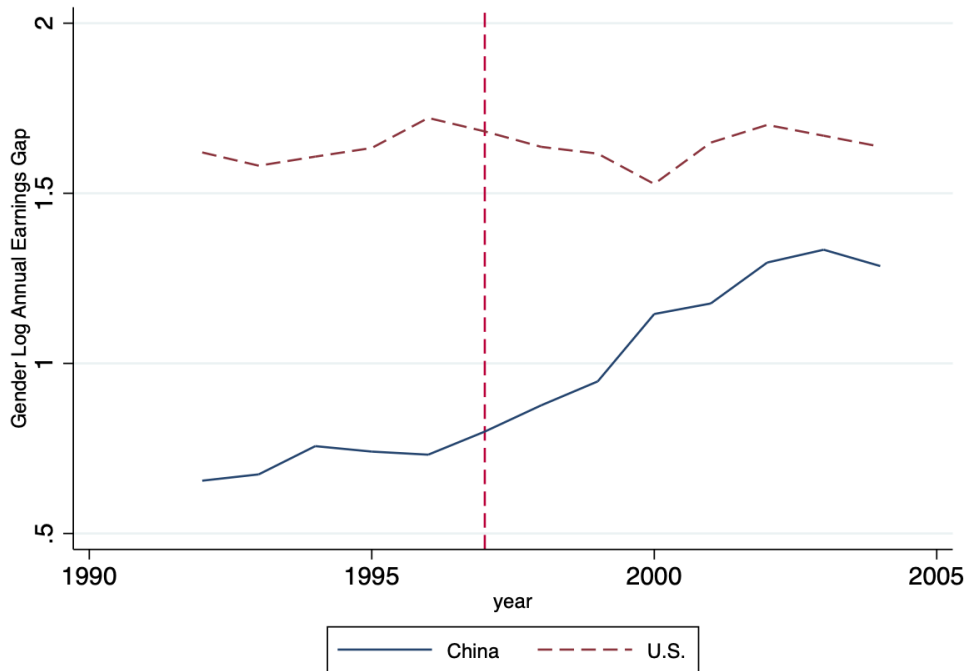
(b) In(Earnings)

Notes: The gender employment gap denotes the difference in employment rate across gender. The gender log annual earnings gap denote the difference of log average annual earnings across genders. China's data comes from Urban Household Survey. U.S.'s data comes from Current Population Survey. We restrict to people aging 20-54 and in the non-agriculture sector in both of the samples. We add a vertical line for year 1997 when the SOE reform was officially announced by the central government.

Figure A4: Reduction of Public Employment Share
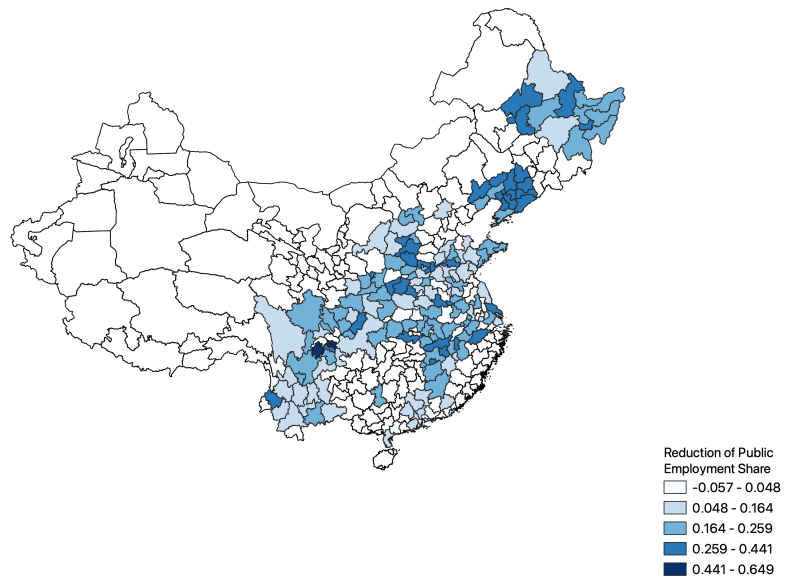
Notes: This figure reports the change of public employment share in each prefecture from 1996 to 2000. Data comes from Statistical Yearbook of each province and prefecture.

Figure A5: Coefficients of the Pre-reform Characteristics


Notes: Left figure reports the results of regressing the reform intensity upon each Industry employment share in 1990; Right figure shows the results of regressing the reform intensity upon each sector employment share in 1992. Employment by industry data comes from Census of 1990. Employment by ownership data comes from Statistical Yearbook of each province and prefectures in 1992.

Figure A6: Gender Gap in Wage and Education
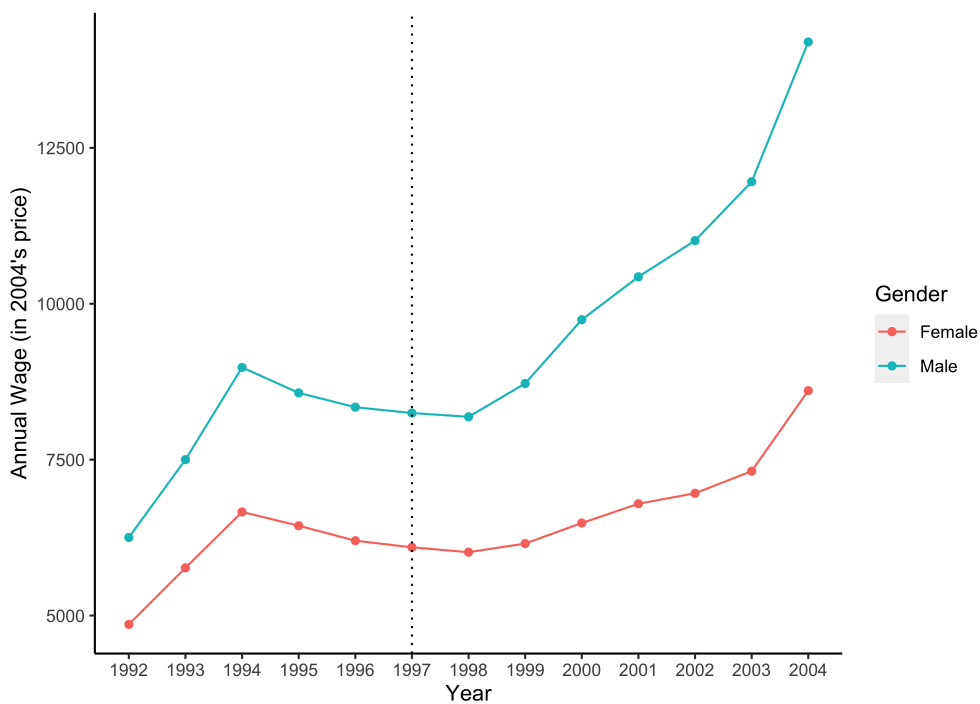
(a) Wage
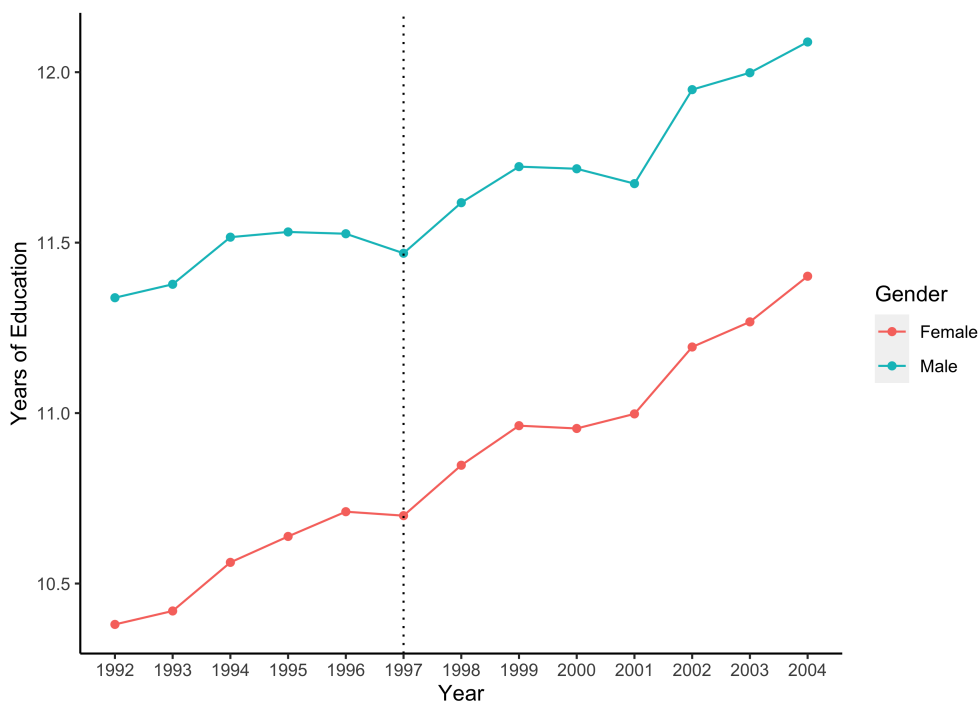
(b) Education

Note: Sources: Data comes from Urban Household Survey(1992-2004). We restrict the individuals to be age 20-54 and be married. We add a vertical line for year 1997 when the SOE reform was officially announced by the central government.

Table A3: Summary Statistics of the Employment Shares

Variables	Mean	SD	Min	Max	N
Pre-SOE Emp Share	0.46	0.11	0.10	0.83	157
Pre-UCE Emp Share	0.17	0.06	0.04	0.33	163
Pre-SOE Emp Share after Adjustment	0.32	0.12	-0.05	0.69	157
Pre-UCE Emp Share after Adjustment	0.15	0.06	0.00	0.31	157
Reduction in Public Employment	0.20	0.09	0.00	0.51	163
Reduction in SOE Employment	0.13	0.07	-0.03	0.37	163
Reduction in UCE Employment	0.06	0.04	-0.06	0.20	163

Notes: Data come from China's Provincial and City Statistical Yearbook and 1990 Census. The denominator of the share is the 15-64 non-agriculture population souced from 2000 Sensus. This sample includes the prefectures in Guangdong Province. We are not able to match every prefecture between the Census and the Statistical Yearbook, resulting in missing data for some prefectures. There exists negative value for the Pre-SOEs Emp Share after Adjustment due to measurement error.

Table A4: Balance Check

	All Prefectures		Prefectures w/o Guangdong	
	Prereform SOE Emp Share	Prereform UCE Emp Share	Prereform SOE Emp Share	Prereform UCE Emp Sh
FDI/GDP	-4.480**	-0.0188	1.704	0.605
	(2.001)	(0.618)	(3.043)	(1.038)
GDP Per Capita$*10^6$	-3.308***	-0.898***	-4.527**	-0.584
	(0.917)	(0.301)	(2.173)	(0.738)
Finance Income/GDP	0.339	-0.0373	-0.0426	-0.160
	(0.595)	(0.351)	(0.671)	(0.415)
Finance Expense/GDP	0.813	-0.156	0.940	0.00751
	(0.551)	(0.294)	(0.583)	(0.315)
Tertiary GDP Share	0.0254	-0.0173	-0.0243	-0.0367
	(0.163)	(0.0556)	(0.167)	(0.0596)
SecondaryGDP	0.318**	0.122**	0.352**	0.115*
	(0.136)	(0.0565)	(0.154)	(0.0642)
Observations	134	134	121	121

Notes: Data come from China's Provincial and City Statistical Yearbook and China City Statistical Yearbook. The outcome data is in 1992. Some prefectures can't be matched across different Statistical Yearbook, so the sample size is smaller than the we in the baseline regressions. Standard errors in parentheses. *significant at 10%,**significant at 5%,***significant at 1%.

Table A5: Individual Characteristics

	Male	Female	P-value
Panel A: 1992-1996			
Age	35.31	35.30	
	(11.18)	(10.96)	0.30
Married	0.73	0.75	
	(0.45)	(0.43)	0.00
Years of schooling	11.39	10.66	
	(2.43)	(2.46)	0.00
Panel B: 1997-2004			
Age	37.03	36.99	
	(11.50)	(11.22)	0.30
Married	0.73	0.75	
	(0.44)	(0.44)	0.00
Years of schooling	11.77	11.25	
	(2.45)	(2.44)	0.00
Observations	80033	236758	

Note: means and standard deviations are presented. Individuals are between age 15 and 54. Data comes from Urban Household Survey (1992-2004). Our sample includes 201 prefectures.