Gender Earnings Inequality in Reform-Era Urban China

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Abstract

This paper analyzes data from the 2005 population mini-census and prefecture-level statistics to investigate the trend in gender earnings inequality and the driving forces behind the trend in reform-era urban China. We pay special attention to the different impacts of marketization and economic development on gender earnings inequality. Cross-sectoral analyses show that the gender earnings gap is smallest in government and public institutions and increases for more marketized sectors. At the prefectural level, we match the mini-census data with prefecture-level statistics and differentiate the effect of economic development from that of marketization. Multi-level analyses show that marketization and economic development affect gender inequality in different ways: the market force has exacerbated gender earnings inequality, whereas economic development has reduced it. Overall, marketization appears to be the main driver of the increasing gender earnings inequality in urban China. Our findings shed new light on the changing gender inequality and the effective policies to promote gender equality in urban China's labor markets.

Introduction

Over the past three decades, China has been experiencing tremendous economic and social changes. The country has seen rapid growth in its total GDP and GDP per capita, and a profound transformation of its economic structure and ownership, especially since the mid-1990s. Accompanying the economic miracle, however, is an exacerbating income inequality. For instance, the Gini coefficient—a common measure of income distribution—has increased from 0.317 in 1978 to over 0.5 in 2012 (Xie and Zhou 2014). Behind the growing inequality are different social and economic forces that have been shaping labor market processes and outcomes in China. The social consequences of these macro-level changes, namely, "who wins and who loses," are a subject of intense interest for many sociologists. Back in the 1990s, there was a scholarly debate—known as the market transition debate—on the changing role of human capital and political capital in social stratification in the course of market transition, with China being the focal context (Nee 1989; Bian and Logan 1996; Xie and Hannum 1996).

The debate remains unresolved to this day for two main reasons. First, there seems to be an "intellectual leap" in the empirical analyses on the social consequences of the market transition (Cao and Nee 2000; Zhou 2000). Scholars often jump to conclusions about the causal mechanisms of social stratification based on the observed inequality among different social groups, without solid knowledge of the underlying social processes that generate the stratification (Wu 2010). Second, it is simplistic to conceptualize the tremendous changes in China solely as a process of marketization, and construe the temporal trend in social inequality as resulting from the market transition. Social change in China over the past three decades has been a multi-dimensional process, involving both institutional transformation and economic development (Walder 2002). Indeed, the emergence and growth of its non-agricultural economy, especially one that is service-oriented, has yielded profound impact on jobs, employment, and wages in labor markets. In investigating the changing dynamics of inequality in contemporary China, it is necessary to distinguish between the impact of marketization and that of economic development—two empirically intertwining but conceptually distinct processes (see Xie and Hannum 1996; Nee 1996).

Indeed, studies on the changing mechanisms of social stratification in China have gone beyond the theoretical framework of the market transition debate in the past decade. The old

focus on differential returns to human and political capital has given way to an emphasis on more general issues related to education, migration, family, intergenerational mobility that comparative social stratification researchers are concerned about. Gender inequality, despite being one of the most important dimensions of social stratification, has not received adequate attention in either empirical analyses or theoretical explanations of changing social stratification in the course of China's economic transition. Moreover, the findings in the limited literature are inconsistent. For instance, based on the data from the China Household Income Project (hereafter, CHIP) in 1988 and 1995, Shu and Bian (2003) found that gender earnings inequality remained unchanged in urban China during the period examined, whereas Mathews and Nee (2000) revealed in a different context that, while men were more likely than women to be engaged in non-farm employment, the contributions of those women who held non-farm jobs to household income increased with the degree of marketization. Zhang *et al.* (2008) analyzed the urban household survey data collected by the National Bureau of Statistics and reported that the female-male income ratio in China decreased from 86.3 percent in 1988 to 76.2 percent in 2004. Beyond the context of China, Brainer (2000) found that gender wage inequality has worsened in Ukraine and Russia over time since the market reform but decreased in other Eastern European countries. Therefore, scholars have yet to reach a consensus on how marketization affects gender earnings differentials in the course of economic transition.

The seemingly contradictory findings can be attributed to two main reasons. On the one hand, the data employed are fragmented in these studies, covering not only different time spans but also different institutional environments.[1] On the other hand, due to the difficulty in operationalizing marketization in empirical analyses, scholars tend to infer its impact from the observed changes over time, thus over-simplifying the multi-dimensional process of socioeconomic transformation. For instance, marketization and economic development in China are both closely correlated with time but are conceptually different. As Walder (1996, p1064) put it, economic growth "indicates the different causal process and should be distinguished from, not identified with, 'market transition'."

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[1] Whereas Shu and Bian (2003) used only two time points to derive the temporal trend in gender inequality in urban labor markets (1988 and 1995), Zhang *et al.* (2008) examined an extended period from 1988 to 2004. And unlike Shu and Bian (2003) and Zhang *et al.* (2008), Mathews and Nee (2000) dealt with non-farm employment and household income in the rural context.

Based on data from the 2005 China population mini-census, along with social and economic indicators at the prefectural level, we aim to empirically distinguish marketization from economic development, and examine their respective impacts on gender earnings inequality in the context of urban China's economic reform. In the rest of the article, we first explain how marketization and economic development could yield differential impacts on gender earnings inequality over time, and derive hypotheses for empirical testing. Given the lack of longitudinal data, we then approximate the gradients of temporal changes since the economic reform with regional variations, and employ multilevel models to examine the effect of marketization and economic development at the prefectural level on gender inequality. Finally, we summarize the empirical findings and discuss the dynamics of gender inequality in post-socialist urban China and the direction of future research in the field.

Marketization, Economic Development and Gender Inequality

The Chinese socialist state has long played an important role in promoting gender egalitarianism (Whyte and Parish 1984). The Constitution of China in 1954 clearly stipulated gender equality and encouraged women to work. As a result, starting in the late 1950s and throughout the Maoist period, over 90 percent of married Chinese women participated in paid work, a much higher percentage than those in many western developed countries (Wolf 1985; Zuo and Bian 2001). By virtue of the work unit (*danwei*) system and the unified wage system under the socialist planning economy, the government successfully implemented various policies aiming to achieve "equal pay for equal work" and strictly prohibited discrimination against women. The gender earnings inequality is mainly attributable to women's relatively lower education and occupational gender segregation.

As the economic reform progressed and the labor administration transformed, labor markets emerged in urban China that have been evolving especially since the mid-1990s. The market is replacing the state as the principal agent of social stratification (Cao and Nee 2000; Nee 1989, 1991, 1996; Nee and Matthews 1996). As the traditional *danwei* system under Chinese socialism was gradually dismantled, most state-owned enterprises (SOEs) were forced to compete in the market. They were granted more autonomy in the recruitment, remuneration and dismissal of their employees. In particular, the SOEs' restructuring in the late 1990s resulted in large-scale layoffs, with the main victims being lowly educated, middle-aged workers, and women. Most of

these laid-off workers were forced to enter the private sector or withdraw from the labor market altogether (Wu 2010). On the other hand, the private sector had been growing exponentially as the most dynamic part of the Chinese economy, offering a myriad of job opportunities for school leavers and laid-off workers. As Figure 1 shows, while workers in the public sector (including state-owned and collectively owned enterprises) accounted for more than 80 percent of total urban employment prior to 1992, in 2008 the percentage had dropped to less than 20 (Li 2013).

Figure 1. Percentage Change of Non-agricultural Population by Work sector, 1978-2008
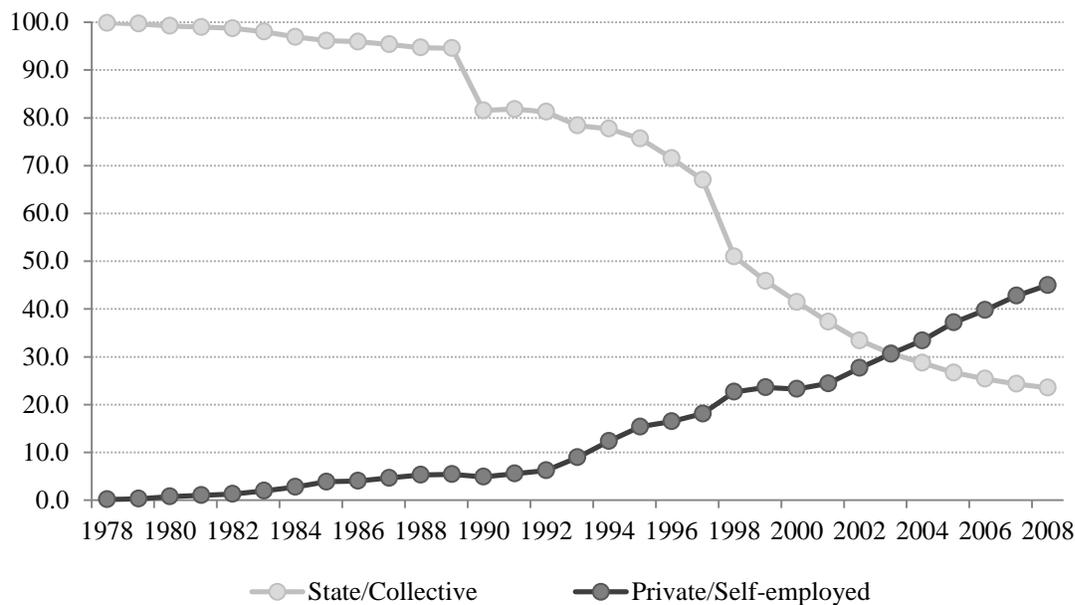
Date Source: National Bureau of Statistics (2009).

Among those working outside the state and collective sectors, a notable portion are self-employed (*geti hu*), who were on their own and fully exposed to the market competition. Studies have shown that, while the self-employed were once the winners in the early reform period, they have since been marginalized and no longer enjoy economic advantages over those in the state sector (Wu and Xie 2003). In the late reform period, self-employment became "a refuge from poverty" (Hanley 2000), a popular recourse for migrant workers from rural areas and those who lost their jobs in the urban state sector, who had difficulty finding formal wage jobs (Wu 2010). The rest of those working outside the state and collective sectors were largely from profit-driven private firms, which placed more emphasis on economic efficiency than social justice when they recruited employees. They hired workers at their own discretion without much government

intervention, often based on workers' demographics, which were considered to be related to their potential productivity and the job requirements.

Despite such new practices in the substantially growing private sector, the state sector is still supposed to implement affirmative action policies favoring women. However, it is no longer monolithic. The post-1978 reforms have sought to convert SOEs to more profit-oriented entities that are less dependent on administrative fiats (Wu 2002). Since the mid-1990s, SOEs have increasingly been allowed to adopt market practices in recruiting, remunerating, and dismissing workers. Recent analyses show that, the most salient difference in terms of income and benefits now exists between government/public institutions and the others, rather than between state and non-state sectors or between public and private sectors (Wu 2013). SOEs now behave more like private enterprises, whereas government agencies and public institutions continue their redistributive role to provide public goods and promote social justice (Wu and Song 2014; Zhang, Hannum and Wang 2008).

Because employers are uncertain about a candidate's ability, they may base employment decisions on visible features such as gender or ethnicity, resulting in labor market discrimination. Even when economic agents (consumers, workers, employers, etc.) are rational and non-prejudiced, "statistical discrimination" can exist and persist when stereotypes based on a group's (e.g., women's) average behavior are relied upon (Arrow 1998; Becker 1957; Phelps 1972). For instance, women are perceived to be less committed to work and more likely to quit for family reasons than men, a pattern that appears to be true statistically. Therefore, with less direct intervention from the state and the lack of labor market regulations, Chinese women may find themselves in even more disadvantaged positions and may encounter greater discrimination than they did before under the gender egalitarian policy of state socialism. The economic marketization has thus yielded far-reaching impact on gender inequality in contemporary China.

Gender inequality in education, employment and earnings is well documented in Western societies, and its temporal trends are often linked to factors such as transformation of the economic structure, education expansion and changes in gender norms (Reskin 2003). A similar process has indeed played a role in shaping gender stratification in China, but is largely ignored because of its intertwining relationship with economic development. The economic structure in

China has transformed from an agriculture-oriented primary industry to a manufacture-oriented secondary industry, and further to a service-oriented tertiary industry over the past decades. The GDP share of the tertiary industry increased from 17.3 percent in 1990 to 45 percent in 2012 (Nation Bureau of Statistics 2013). The industrial upgrading would lead to a changing demand of workers' skills thereby affecting the inequality structure in the labor markets. In an economy dominated by agriculture and manufacturing, workers must be physically strong in order to perform their occupational duties, so women are obviously at a disadvantage. However, in a service economy where more non-manual jobs are available, women may have some relative advantages working in a less demanding environment (typically in office) on non-manual jobs with higher pay. As a result, their socioeconomic disadvantages are reduced in the labor markets (Rosenzweig and Zhang 2012; Pitt, Rosenzweig and Hassan 2010).

The service economy demands more educated workers. Not incidentally, along with the economic development, the Chinese government had set the target of implementing nine-year compulsory education back in the late 1980s, and the goal was largely achieved in the 1990s: the primary school enrollment rate reached 98 percent, and the junior high school enrollment rate was close to 100 percent. Beyond the compulsory level, the enrollment rate for senior high school reached 60 percent in 2005, double the rate in the 1980s. Higher education has also expanded substantially since 1998 and has been favoring women, whose disadvantages continue to shrink over time (Bauer et al. 1992; Lavely et al. 1990; Hannum 2005). At some education levels, the gender gap has even reversed. In fact, women now enjoy some educational advantages over men (Wu and Zhang 2010). This trend is consistent with the findings from most of developed countries (DiPrete and Buchmann 2013).

Comparative studies have found two main contributing factors to gender earnings gaps: differences in qualifications and occupational sex segregation. First, historically, women are less educated than men. As education is regarded as one of the most important determinants of labor market outcomes, women earn less than men. Comparative studies have suggested that it is primarily the differing levels of education distribution between men and women that is rendering the larger gender earnings gaps in developing countries relative to developed countries (Schultz 1994, 1995). Second, women and men tend to be engaged in different occupations. In addition to gender difference in occupational choices, women's lower educational attainment also plays an

important role in determining their labor force participation and their access to higher-paying jobs and industries (Tilly 1998). In general, the occupations dominated by women pay less, leading to gender disparities in earnings (Peterson and Morgan 1995; Charles and Grusky 2004). The educational expansion would boost their labor force participation, returns to human capital, and their chances of entering occupations that are associated with a higher socioeconomic status but which are traditionally dominated by men. In the case of China, some researchers have found that the educational gender gap has narrowed (Bauer et al. 1992), and occupational gender segregation has decreased during the years from 1990 to 2000 (Wu and Wu 2008). If occupational gender segregation generates gender earnings inequality, we can expect gender earnings inequality to decline over time.

Hence, we can see that, over the past three decades of social and economic changes in China, multiple, interrelated macro-level forces have been shaping the pattern of gender inequality jointly but in diametrically opposing ways. We differentiate the effect of marketization from that of economic development, and argue that marketization may exacerbate gender earnings inequality and put women in even more disadvantaged positions in transitional labor markets, whereas the upgrading of the economic structure and the expansion of education in the course of economic development may reduce gender earnings gaps and elevate women's socioeconomic status. The overall trend in gender earnings inequality may be contingent upon the relative influences of the various macro-level forces.

Research Design and Hypotheses

As mentioned earlier, we aim to examine how socioeconomic changes have affected gender stratification in urban China, paying special attention to the impact of marketization on gender earnings disparities. Without longitudinal data, however, we are unable to gauge how gender earnings inequality has changed with the rise of market forces. As a legacy of the socialist economy, work sectors continue to play a crucial role in the economic and social lives of China's urban residents (Bian 1994; Bian and Logan 1996; Tang and Parish 2000; Walder 1992; Xie and Hannum 1996). Because most people receive their income from work units, the different types of work unit ownership can, to some extent, be used to capture the degree of marketization (Wu 2002). Wu and Song (2014) developed a classification of work units: government/public institutions, public enterprises, private enterprises and self-employment. These sectors constitute

a continuum approximating the decline in the influence of the redistributive state and the increase in the influence of market forces. With such a research design, they investigated the impact of market transition on the wellbeing of Chinese ethnic minorities.

As the first step, we borrow Wu and Song's (2014) research design to examine the gender disparity across employment sectors to show how marketization has affected the life chances of Chinese women. Based on the previous discussion, we propose the following hypothesis:

Hypothesis 1: *Gender inequality increases with the degree of marketization of work sectors. In other words, earnings differentials between men and women are the smallest in government/public institutions and the largest in the private sector, with those in public enterprises falling somewhere in between.*

Using work sector as a proxy of marketization is not an ideal design, because work sectors may differ in many ways, thus the specific implications for gender stratification are not clear. Therefore, it would be better to employ explicit and concrete measures of marketization and differentiate them from confounding factors such as economic development.

Scholars have paid attention to the regional variations in social and economic development and used measures of marketization at the regional level as proxies for temporal changes in China. For instance, economists in China have constructed an index of marketization for each province, which is updated every year (Fan *et al.* 2011). Therefore, the variations in the outcomes of interest across provinces can be linked specifically to the level of marketization (or other measures) in each province. Nevertheless, measures at the provincial level are crude with substantial within-provincial variations. To capture more variations across regions, measures at a more fine-tuned geographical unit are desirable provided that the relevant data are available.

Based on a large sample of cross-sectional data, we construct marketization and economic development measures at the prefectural level and estimate their respective impacts on gender earnings disparities simultaneously. Based on our earlier discussion on the relationship between marketization and gender inequality, we further propose the following hypothesis in line with Hypothesis 1:

Hypothesis 2: *The more marketized a prefecture is, the larger the gender earnings gap in that prefecture.*

Marketization is highly correlated with the level of economic development. From our earlier discussion on the relationship between economic development and gender inequality, we predict the following:

> Hypothesis 3: *The more economically developed a prefecture is, the smaller the gender earnings gap in that prefecture*.

In the following, we first examine gender earnings gaps across sectors and then show how these gaps vary with the level of marketization and economic development across prefectures. Even though our analyses are focused on regional variations, we interpret findings to also shed light on the temporal trends in gender inequality under different forces in the process of social change in China.

Data, Variables and Methods

Data

The data we analyze are extracted from the one-percent population sample survey of China in 2005 (known as the "mini-census"). This multi-stage stratified clustering probability sampling survey was conducted by the National Bureau of Statistics to collect social and demographic information on the national population in China between two censuses. Unlike previous censuses and mini-censuses, the survey in 2005, for the first time, collected information on respondents' earnings, work unit sector, working hours, and fringe benefits, in addition to employment status, occupation (2-digit code), *hukou* status, place of *hukou* registration, current place of residence, education and other demographics (Wu 2014). Compared to the academic survey data collected by research institutes, the mini-census has a much larger sample size, enabling us to link individuals to the small geographic units where they reside (prefecture in this article). We restrict the analysis to the non-farm working population in urban areas who were aged between 18 and 54 at the time of survey and exclude farmers and the self-employed. We also match the individual-level data from the mini-census with prefecture-level statistics. After deleting cases with missing data on either the individual or prefectural levels, we are left with 55,240 observations from 283 prefectures in 29 provinces of China.

Variables and Measures

Our main research interest in this article is gender inequality. The mini-census solicited information on monthly income using the item "income in the last month" (October, 2005), which included wages/salary and other sources of income such as transferred earnings. Money derived from rental properties was not included. In this analysis, the self-employed is excluded, and the income here, primarily wages, is almost identical to earnings. As the labor markets and employment have become increasingly flexible and individuals' working hours vary substantially, we compute the hourly wage rate and take its logarithm as the dependent variable of the following analysis.

At the individual level, our key independent variable is gender, coded as a dummy (1 if female and 0 otherwise). Other individual characteristics include years of schooling, work experience, as well as marital status, *hukou* status, work unit sector, and occupation. We convert respondents' level of education to years of schooling: illiterate=0; primary school=6; junior high school=9; senior high school=12; specialized college=15; university=16; and graduate school=19. To measure work experience, we deduct from age 7 plus the number of years of schooling, and also add a squared term to capture the curvilinear relation between work experience and earnings (Mincer 1974). Marital status and *hukou* status are both coded as dummies (1 if married and 0 otherwise; 1 if rural *hukou* and 0 otherwise). Work unit sector is coded into three categories: 1=government/public institutions; 2= public enterprises; and 3= private sector. Occupation is coded into 5 categories: 1= managers; 2 = professional/ associate professionals, 3=office clerks; 4 =service workers; and 5= manual workers. Both sector and occupation are treated as dummy variables in multivariate analyses.

At the prefectural level, the key contextual variables of interest are marketization and economic development. We first use the share of employment in the private sector as the proxy for marketization and the GDP per capita to denote the level of economic development. We then gather the social and economic statistics at the prefectural level from the *China City Statistical Yearbook* in 2005, including the share of employment in the tertiary industry, the share of employment in the private sector, gross industry output value (GIOV), GDP per capita, education expenditure, the share of fiscal budget in local GDP, among others, based on which we conduct

factor analysis and extract two common factors to proxy marketization and economic development. As a result, the share of employment in the private sector directly enters the first factor, along with other indicators of high loadings such as GDP per capita, local average wages, and the share of domestic enterprises in GDP output, whereas GDP per capita and GIOV directly enter the second factor, along with other variables such as the share of employment in the tertiary industry, educational expenditure and the share of fiscal budget in local GDP.

Based on the two extracted factors, we construct the index of marketization and the index of economic development in four steps. First, we standardize all the variables that entered the factors; second, for those variables with negative loading, we reverse the scale so that all the variables conceptually go in the same direction; third, for each factor, equal weights are assigned to the variables that belong to the factor (Treiman 2009). To render the index varying from 0 to 1, in the last step, we subtract the minimum value of index from the figures we got from the second step, and then divide the number by the difference between the maximum and minimum values. To check whether the constructed index is in line with our intuitive understanding of variations across cities, we list the top 10 prefectural cities in terms of either index (see Table 1).

Table 1. Top 10 Prefecture-level Cities by Index of Economic Development and Index of Marketization

	Marketization			Economic Development		
	Code	Name	Value	Code	Name	Value
1	4403	Shenzhen	100.00	3101	Shanghai	100.00
2	3205	Suzhou	81.50	1101	Beijing	81.72
3	3502	Xiamen	78.77	4403	Shenzhen	74.92
4	3302	Ningbo	78.18	4401	Guangzhou	56.25
5	4420	Zhongshan	77.90	3205	Suzhou	46.61
6	3304	Jiaxing	77.76	1201	Tianjin	45.57
7	4404	Zhuhai	77.66	3301	Hangzhou	42.88
8	3505	Quanzhou	76.92	3302	Ningbo	39.21
9	4413	Huizhou	76.37	3201	Nanjing	38.12
10	3306	Shaoxing	72.04	3202	Wuxi	36.44

According to the index of economic development, Shanghai is ranked no. 1, followed by Beijing and Shenzhen; according to the index of marketization, Shenzhen is ranked no. 1, followed by Suzhou and Xiamen. Notwithstanding the high and positive correlations between

marketization and economic development, the prefectures with the highest degree of marketization may not necessarily enjoy the highest level of economic development, and vice versa, as shown in Figure 2.

Figure 2. Scatterplot of Economic Development Index and Marketization Index
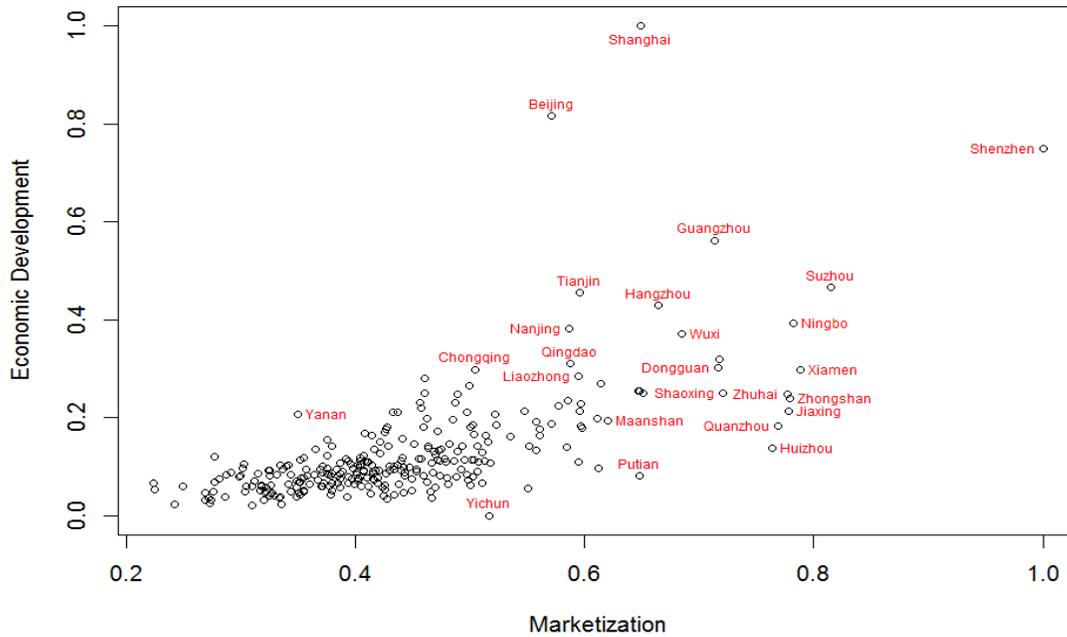
Models and Analytical Strategy

We first employ OLS regression models to estimate the gender differences in hourly wage, taking into account years of schooling, work experience and its squared term, *hukou* status, marital status, *danwei* and occupation. The model is specified as follows:

$$\ln(Earnings) = \beta_0 + \beta_1 Female + \beta_2 Schooling + \beta_3 Exp + \beta_4 Exp^2 + \beta_5 Marry + \beta_6 Rural$$
$$+ \beta_7 Han + \beta_8 Danwei + \beta_9 Occup + \varepsilon$$

$$(1)$$

$\ln(Earnings)$ is the natural logarithm of an individual's hourly wage. *Female* is a dummy variable. As defined previously, *Schooling* and *Exp* are two continuous variables, measured in years. *Marry* is a dummy variable with 1 denoting married, and 0 otherwise; likewise, *Rural* and *Han* are also dummy variables representing *hukou* status and ethnicity respectively. *Danwei* is a

three-category variable denoting work sector. *Occup* is a five-category occupation variable. Here, β_1 is the main effect of female, and ε is a residual term.

Second, we run the OLS regression for each work sector to investigate how the gender wage gap would vary, based on the assumption that government/public institutions, public enterprises, and the private sector form a continuum of marketization. We also include prefectural dummies to take into account regional inequality.

OLS regression models with prefecture dummies, nevertheless, would not allow us to address how gender earnings inequality varies by regional context—the central interest of this article. Therefore, we employ two-level linear models to investigate the differential effects of marketization and economic development on gender earnings inequality: the Level 1 model is an individual-level model, and the Level 2 model is a prefecture-level model. To show the regional variation of the gender effect and the educational effect at the individual level while taking into account the covariance structure of the two-level model, we allow the Level 1 residuals and coefficients of female and schooling to vary by a regional characteristic of our interest. The models are specified as follows:

Level 1 (Individual-level):

$$\ln(Earnings)_{ij} = \beta_{0j} + \beta_{1j}Female_{ij} + \beta_{2j}Schooling_{ij} + \beta_{3j}Exp_{ij} + \beta_{4j}Exp^2{}_{ij} +$$
$$\beta_{5j}Marry_{ij} + \beta_{6j}Rural_{ij} + \beta_{7j}Han_{ij} + \beta_{8j}Danwei_{ij} + \beta_{9j}Occup_{ij} + \varepsilon_{ij}$$

$$(2)$$

Level 2 (Prefecture-level):

$$\beta_{0j} = \gamma_{00} + \gamma_{01}GDPpercapita_j + \gamma_{02}R\_Private_j + u_{0j} \qquad (3)$$
$$\beta_{1j} = \gamma_{10} + \gamma_{11}GDPpercapita_j + \gamma_{12}R\_Private_j + u_{1j} \qquad (4)$$
$$\beta_{2j} = \gamma_{20} + \gamma_{21}GDPpercapita_j + \gamma_{22}R\_Private_j + u_{2j} \qquad (5)$$
$$\beta_{3j} = \gamma_{30} \qquad (6)$$
$$\beta_{4j} = \gamma_{40} \qquad (7)$$
$$\beta_{5j} = \gamma_{50} \qquad (8)$$
$$\beta_{6j} = \gamma_{60} \qquad (9)$$
$$\beta_{7j} = \gamma_{70} \qquad (10)$$
$$\beta_{8j} = \gamma_{80} \qquad (11)$$
$$\beta_{9j} = \gamma_{90} \qquad (12)$$

where j indexes the jth prefectures. Note that u_{0j} and u_{1j} are prefecture-level residual terms, which are assumed to follow a multivariate normal distribution, and the Level 1 residuals are also assumed to be normally distributed, i.e., $\varepsilon_{ij} \overset{iid}{\sim} N(0, \sigma^2)$. In this specification, the parameter β represents a "return" to an independent variable in 2005. Note that GDP per capita (our measure of economic development) and share of employment in the private sector (our measure of marketization) enter the model only as predictors of the β vector. If we substitute Eq. (3) to (12) into (2), the following equation can be obtained:

$$\ln(Earnings)_{ij} =$$
$$\gamma_{00} + \gamma_{01}GDPpercapita_j + \gamma_{02}R\_private_j + \gamma_{10}Female_{ij} + \gamma_{20}Schooling_{ij} + \gamma_{11}Female_{ij} \cdot$$
$$GDPpercapita_j + \gamma_{12}Female_{ij} \cdot R_{private_j} + \gamma_{21}Schooling_{ij} \cdot GDPpercapita_j +$$
$$\gamma_{22}Schooling_{ij} \cdot R_{private_j} + \gamma_{30}Exp_{ij} + \gamma_{40}Exp^2{}_{ij} + \gamma_{50}Marry_{ij} + \gamma_{60}Rural_{ij} + \gamma_{70}Han_{ij} +$$
$$\gamma_{80}Danwei_{ij} + \gamma_{90}Occup_{ij} + \beta_{0j}u_{0j} + u_{1j}Female_{ij} + u_{2j}Schooling_{ij} + \varepsilon_{ij}$$

$$(13)$$

In the Level 2 model, the coefficient β_{1j} represents gender difference in the logarithms of hourly wage, which can be considered the sum of the averages across prefectures and the heterogeneity within prefectures. For the latter, logged hourly wage changes in gender returns consist of two components: (1) a systematic component due to GDP per capita and share of employment in the private sector, and (2) a prefecture-level residual term (u_{1j}). In Eq. (4), γ_{10} refers to the average change across prefectures in gender returns if there is no economic development and marketization, γ_{11} refers to the amount of change associated with economic development, γ_{12} refers to the amount of change associated with marketization, which is the change in variation at the prefecture level not captured by the multilevel models. u_{1j} refers to prefectural differences that are not captured by the multi-level model.

If γ_{01}, γ_{02}, γ_{11}, γ_{12}, γ_{21} and γ_{22} are 0, the model would be a "random coefficient" model. In this case, GDP per capita and the share of employment in the private sector would not affect wage determination; their effects would fall randomly across each prefecture. If γ_{01}, γ_{02}, γ_{11}, γ_{12}, γ_{21}, γ_{22}, u_{1j} and u_{2j} are all 0, then the model becomes a "variance component" model. In

this case, the intercept would vary randomly across prefectures, suggesting that only the overall wage level would vary by prefecture.

In estimating the model, the covariance matrix is specified to be unstructured, given that it imposes the fewest assumptions by allowing every term to differ. It can be used where each variance and unique covariance is freely estimated (Sophia and Anders 2008).

$$\begin{pmatrix} u_{0j} \\ u_{1j} \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \tau_{00} & \tau_{01} \\ \tau_{10} & \tau_{11} \end{pmatrix} \right) \tag{14}$$

The Level 1 model residuals are independent of the Level 2 residuals, suggesting that the unobserved characteristics of each worker do not vary by prefecture.

$$\text{cov}(\varepsilon_{ij}, u_{kj}) = 0, \ k = 0,1 \tag{15}$$

Results

Descriptive Statistics

Table 2 presents descriptive statistics for selected variables to be included in the analysis. The average hourly wage is 6.68 *yuan* for men and 5.38 *yuan* for women. In other words, men earn 24 percent [= (6.68-5.38)/5.38] more than women per hour. Of course, the disparity may be due to different characteristics between men and women associated with earnings. Indeed, as shown in the table, men tend to have more schooling and more work experience than women. In addition, there is a clear gender difference in the distributions of employment sectors and occupation. Compared to men, women are more likely to work in government/public institutions or the private sector, and also to work as professionals and service workers.

Results from OLS Regression

Table 3 presents estimated coefficients for OLS regression models. Model 1 is the baseline, with gender, years of schooling, work experience and its squared term, marital status, *hukou* status, ethnicity, and prefecture dummies as the independent variables. Results show that, except for ethnicity, all other variables have significant effects on logged hourly wages (p<.001). Other things being equal, a year increase in schooling increases hourly wages by 12.0 percent (=$e^{0.113}$-1). The effect of work experience is concave, first increasing and then decreasing roughly after reaching 33 years of experience.

Table 2. Descriptive Statistics of Selected Variables

National Sample	Mean		
	Total	Male	Female
Individual			
Hourly Wage (*Yuan*)	6.13	6.68	5.38
	(6.18)	(6.56)	(5.52)
Years of Schooling	10.85	10.91	10.76
	(3.00)	(2.95)	(3.07)
Work Experience	16.93	17.79	15.74
	(9.77)	(9.80)	(9.59)
Work Experience^2	382.00	412.61	339.79
	(366.35)	(379.38)	(343.15)
Married %	77.62	78.87	75.89
Rural *Hukou* %	41.18	41.21	41.13
Work Sector %			
Government/Public Institutions	15.57	14.94	16.44
State/Collectively Owned Enterprises	24.15	26.09	21.47
Private/Self-employed	60.28	58.97	62.09
Occupation %			
Manager	3.51	4.71	1.85
Professional/Associate Professional	16.30	13.01	20.85
Office Clerk	10.91	12.39	8.88
Service Worker	29.78	24.88	36.53
Manual Worker	39.50	45.02	31.88
N	55,240	32,022	23,218
Prefecture-level City			
Single Indicator			
Employment Share of Private Sector			0.44
			(0.14)
GDP per Capita/100,000 yuan			0.17
			(0.21)
Constructed Index			
Index of Marketization			0.44
			(0.12)
Index of Economic Development			0.12
			(0.11)
N			283

Notes: Numbers in parentheses are standard deviations.

Table 3. OLS Regression Predicting Logged Earnings

VARIABLE	Model 1	Model 2	Model 3
Female	-0.225***	-0.227***	-0.218***
	(0.005)	(0.005)	(0.005)
Years of Schooling	0.113***	0.101***	0.087***
	(0.001)	(0.001)	(0.001)
Experience	0.014***	0.013***	0.012***
	(0.001)	(0.001)	(0.001)
Experience^2/100	-0.021***	-0.021***	-0.023***
	(0.003)	(0.003)	(0.003)
Married	0.052***	0.045***	0.042***
	(0.008)	(0.008)	(0.008)
Rural *Hukou*	-0.145***	-0.100***	-0.098***
	(0.006)	(0.006)	(0.006)
Han	0.004	0.005	0.01
	(0.013)	(0.013)	(0.013)
Work Sector (ref.: Government/Public Institutions)			
State/Collective		-0.062***	-0.003
		(0.008)	(0.008)
Private Sector		-0.233***	-0.148***
		(0.008)	(0.009)
Occupation (ref.: Manual Worker)			
Manager			0.395***
			(0.013)
Professional/Associate Professional			0.170***
			(0.008)
Office Clerk			0.102***
			(0.009)
Service Worker			-0.093***
			(0.006)
Prefecture Dummy	yes	yes	yes
Constant	0.582***	0.878***	0.942***
	(0.025)	(0.027)	(0.027)
N	55,240	55,240	55,240
R^2	0.406	0.418	0.436
Adjusted R^2	0.403	0.415	0.433

Notes: ***p<0.001, ** p<0.01, * p<0.05. Numbers in parentheses are standard errors.

Those who hold rural *hukou* are disadvantaged, earning 13.6 percent ($=1\text{-}e^{-0.145}$) less than their urban counterparts; those who are married tend to earn 5 percent ($=e^{0.052}\text{-}1$) more than those who are not. After controlling for all of these factors, females continue to be disadvantaged in earnings, earning 20.1 percent ($=1\text{-}e^{-0.225}$) less than males (Model 1).

Because men and women may be sorted into different types of work sectors and occupations which are likely to mediate the gender effect, we introduce the employment sector (as two dummy variables) in Model 2 and further control for the effect of occupation (as four dummy variables) in Model 3. Consistent with what has been reported elsewhere (Wu 2013), those working in public enterprises and private enterprises earn a significant 6.01 percent ($=1\text{-}e^{-0.062}$) and 20.8 percent ($=1\text{-}e^{-0.233}$) less than their counterparts in government/public institutes, respectively (Model 2). Even after controlling for the effect of occupation (Model 3), females continue to earn 19.6 percent ($=1\text{-}e^{-0.218}$) less. The difference is statistically significant (p<.001).

To test Hypothesis 1 – variation in gender earnings inequality by employment sector – in Table 4, we replicate Model 3 of Table 3 for each of the three sectors. Results show that the gender earnings gap is the greatest in the private sector, followed by public enterprises and government /public institutions. As shown in Figure 3, women earn 24.3 percent ($=1\text{-}e^{-0.276}$), 15.0 percent ($=1\text{-}e^{-0.162}$), and 6.2 percent ($1\text{-}e^{-0.064}$) less than men in these three sectors. Confirming Hypothesis 1, gender earnings gap increases with the marketization of the work unit sector.

Findings from Multilevel Models

The analyses from OLS regression are based on an assumption of regional homogeneity, namely, the estimated effects of independent variables are the average effects of the overall sample. They fail to reveal how the effect of an independent variable (gender) would vary by a specific characteristic of the prefectural context. To address the questions pertaining to Hypotheses 2 and 3, we employ multi-level models. As the intra-class correlation coefficient (ICC) of the null model shows, about 6.33 percent of the variance can be explained by income differences across prefectures (not shown here). Therefore, it is necessary to take into account the regional heterogeneity in analyzing gender inequality.[2] Given the varied pace of economic reform across regions, we argue that regional heterogeneity can to some extent approximate the temporal trends in the impact of economic reform.

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[2] To justify the use of random effect model, we conduct Breusch-Pagan statistic test, which tests the null hypothesis and estimates whether the Level 2 variance is equal to 0, likelihood-ratio test, which compares the fitting variance-components model with the model without random intercept, and the score test, which is based on a quadratic approximation of the likelihood at $\psi = 0$. Since all three tests show consistently significant results (p<0.001), the prefectural random effect should be taken into account.

Table 4. OLS Regression Predicting Logged Hourly Wage by Work Sector

VARIABLE	Gov't/Pub. Inst.	State/Collective	Private
Female	-0.064***	-0.162***	-0.276***
	(0.010)	(0.009)	(0.007)
Year of Schooling	0.097***	0.084***	0.082***
	(0.002)	(0.002)	(0.002)
Experience	0.024***	0.011***	0.007***
	(0.002)	(0.002)	(0.001)
Experience^2/100	-0.029***	-0.020***	-0.016***
	(0.005)	(0.005)	(0.003)
Married	0.039*	0.062***	0.056***
	(0.016)	(0.015)	(0.010)
Rural *Hukou*	-0.346***	-0.157***	-0.066***
	(0.020)	(0.014)	(0.008)
Han	0.002	-0.001	0.007
	(0.024)	(0.027)	(0.017)
Occupation (ref.: Manual Worker)			
Manager	-0.010	0.304***	0.577***
	(0.027)	(0.025)	(0.020)
Professional/Associate Professional	-0.010	0.101***	0.254***
	(0.021)	(0.013)	(0.014)
Office Clerk	-0.018	0.030*	0.125***
	(0.021)	(0.014)	(0.016)
Service Worker	-0.230***	-0.107***	-0.072***
	(0.025)	(0.012)	(0.007)
Prefecture Dummy	controlled	Controlled	controlled
Constant	0.816***	0.934***	0.892***
	(0.050)	(0.046)	(0.035)
N	8,601	13,339	33,300
R^2	0.527	0.419	0.373
Adjusted R^2	0.511	0.406	0.368

*Notes: ***p<0.001, ** p<0.01, * p<0.05. Numbers in parentheses are standard* errors.

Figure 3. Gender Earnings Gap by Work Sector
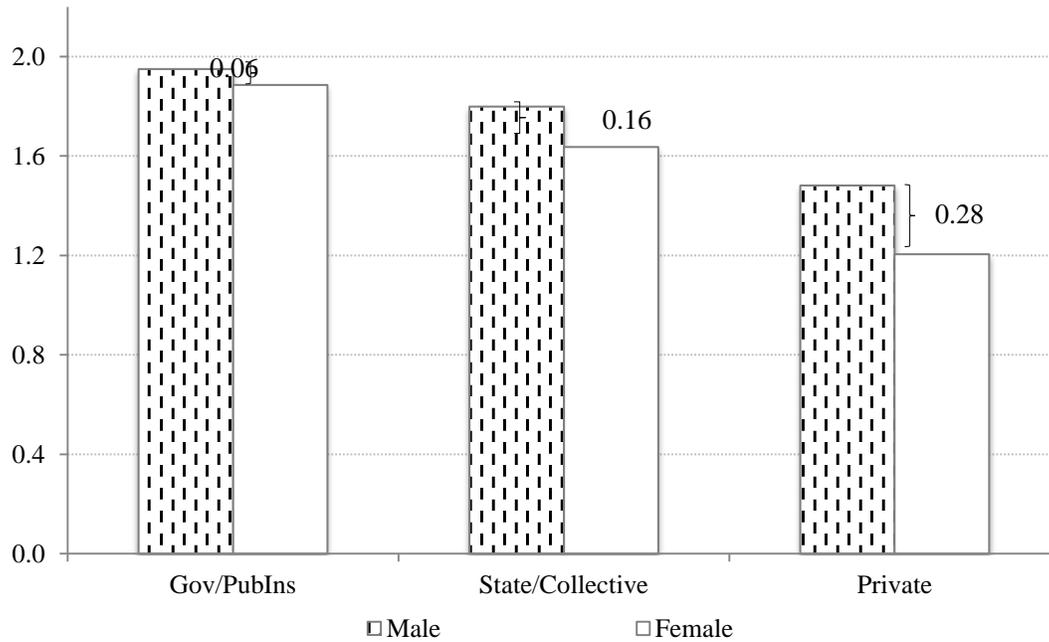
Notes: This figure is based on the OLS regression from Table 3.

In Table 5, we estimate a series of nested multi-level models by relaxing model restrictions step by step. To test the hypotheses at regional level, we first use a single measure of marketization and of economic development in the model estimation. We then employ the constructed index of marketization and index of economic development to replicate the results.

Model 1 of Table 5 includes individual-level variables only: female, schooling, some other demographic characteristics, and work unit sector; Model 2 controls for occupational categories. Consistent with the results from OLS regression analyses reported in Table 4, women earn significantly less than men, holding constant the other variables. In Model 3, we add the share of employment in the private sector and GDP per capita, denoting marketization and economic development, respectively, at the prefectural level. Results show that the estimated γ_{01} for economic development and γ_{02} for marketization are both significantly positive (p<.005), suggesting that people tend to earn more in prefectures that are more developed or more marketized. In Model 4, we further allow the coefficient β_{1j} for female to vary by marketization and economic development by adding its interaction terms with these two prefecture-level

characteristics. The coefficient of the interaction term between female and marketization γ_{12} is negative and statistically significant (p<.01), whereas the coefficient of the interaction term between female and economic development γ_{11} is positive, though statistically insignificant.

Table 5. Hierarchical Linear Model Predicting Logged Hourly Wage (N=55,240)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Individual Level						
Female	-0.261***	-0.251***	-0.253***	-0.215***	-0.225***	-0.207***
	(0.008)	(0.008)	(0.008)	(0.017)	(0.017)	(0.031)
Schooling	0.076***	0.063***	0.064***	0.064***	0.048***	0.029***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.006)
Prefectural Level						
EcoDevelop			0.379***	0.359***	-0.228**	-0.254
			(0.046)	(0.048)	(0.088)	(0.204)
Marketization			1.052***	1.183***	0.745**	0.239
			(0.142)	(0.149)	(0.289)	(0.214)
Interaction						
Marketization*Female				-0.281**	-0.255*	-0.152*
				(0.103)	(0.105)	(0.075)
EcoDevelop*Female				0.044	0.085**	0.181**
				(0.028)	(0.029)	(0.064)
Marketization*Schooling					0.040	0.050**
					(0.024)	(0.016)
EcoDevelop*Schooling					0.053***	0.087***
					(0.007)	(0.015)
Occupation	No	Yes	Yes	Yes	Yes	Yes
Work Sector	Yes	Yes	Yes	Yes	Yes	Yes
Other Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.621***	0.735***	0.499***	0.481***	0.664***	0.682***
	(0.003)	(0.029)	(0.037)	(0.038)	(0.052)	(0.088)
Log-Likelihood	-44722	-43854	-43790	-43786	-43748	-43696
d.f.	9	13	15	17	19	19

Notes: ***p<0.001, ** p<0.01, * p<0.05. Numbers in parentheses are standard errors. In this table, only the results from the fixed part are displayed. All regression models are random-intercept random-coefficient models, where the coefficients of female and schooling are the ones that vary by a prefectural level characteristic. From Models 1-5, the measure of marketization is employment share of private sector while the measure of economic development is GDP per capita / 100,000 yuan. In Model 6, the constructed indices of marketization and economic development are used.

Therefore, in confirmation of Hypotheses 2 and 3, in prefectures where the employment share of the private sector is higher, gender earnings inequality is larger, suggesting that marketization tends to exacerbate gender inequality and make women worse off. In contrast, the higher the GDP per capita of a prefecture, the smaller the gender earnings inequality. In other words, women tend to benefit from economic development.

As education plays an important role in explaining gender earnings inequality (Psacharopoulos 1981), in Model 5 we also include the interactions between schooling and each of the prefectural characteristics. The results show that, returns to schooling increase with both the level of economic development and the level of marketization, but the effect of the latter is not statistically significant. After controlling for the regional variations in returns to education, the two interactions between female and marketization and between female and economic development remain significant. Coefficient γ_{12} is -0.255, and given the employment share of the private sector varies from 0.1 to 0.86, γ_{12} would contribute -0.026 (=-0.255*0.1) to 0.219 (=-0.255*0.86) to the baseline gender effect of -0.225. Similarly, the estimated coefficient γ_{11} would contribute 0.020 to 0.231 to the baseline gender effect, given the fact that GDP per capita varies from 0. 2 to 27.2 (unit: 100,000 *yuan*). Hypotheses 2 and 3 are thus supported. To check the robustness of the results, we re-estimate the models using alternative measures of marketization and economic development—the indices derived from factor analysis in Model 6. Results remain largely the same.

Because some people may delay their entry into the labor market so that they could receive more education, and women tend to retire earlier than men, whether or not we include these people in the analysis could potentially affect our results. We thus restrict our sample to those at prime working age (i.e. those aged between 25 and 50). Results in Table 6 reveal that the substantive conclusion remains the same as that in Table 5, except for slight differences in coefficients. Hence, our findings are robust.[3]

Figure 4 presents the results more intuitively. As Hypotheses 2 and 3 have predicted, the gender earnings gap decreases with the level of economic development but increases with the degree of marketization.

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[3] To rule out the possibility that the highly developed prefectures may drive the results, we further run the regression by excluding Shanghai, Shenzhen and Beijing, because, as mentioned earlier and also as indicated in Figure 2, these cities could be outliers in terms of both marketization and development.

Table 6. Robustness Check: Hierarchical Linear Regression Predicting Logged Hourly Wage among Those Aged 25-50 (the Working Population) (N=43,554)

`	Model 1 Single Indicator	Model 2 Constructed Index
Individual level		
Female	-0.203***	-0.165***
	(0.019)	(0.033)
Schooling	0.043***	0.022**
	(0.004)	(0.007)
Prefectural Level		
Marketization	0.793*	0.209
	(0.309)	(0.228)
EcoDevelop	-0.276**	-0.332
	(0.093)	(0.214)
Interaction		
Marketization*Female	-0.450***	-0.267***
	(0.112)	(0.080)
EcoDevelop*Female	0.075*	0.177**
	(0.030)	(0.067)
Marketization*Schooling	0.039	0.055**
	(0.025)	(0.017)
EcoDevelop*Schooling	0.059***	0.094***
	(0.008)	(0.016)
Occupation	controlled	controlled
Work Sector	controlled	controlled
Other Demographics	controlled	controlled
Constant	-0.623***	-0.623***
	(0.003)	(0.003)
Log-Likelihood	-35130	-35081

Notes: ***p<0.001, ** p<0.01, * p<0.05. Numbers in parentheses are standard errors. In this table, only the results from the fixed part are displayed. All regression models are random-intercept random-coefficient models, where the coefficients of female and schooling are the ones that vary by a prefectural level characteristic. For a/the single indicator, the measure of marketization is employment share of private sector while the measure of economic development is GDP per capita/100,000 yuan.

Figure 4. Change in Expected Logged Earnings by Level of Economic Development and Marketization
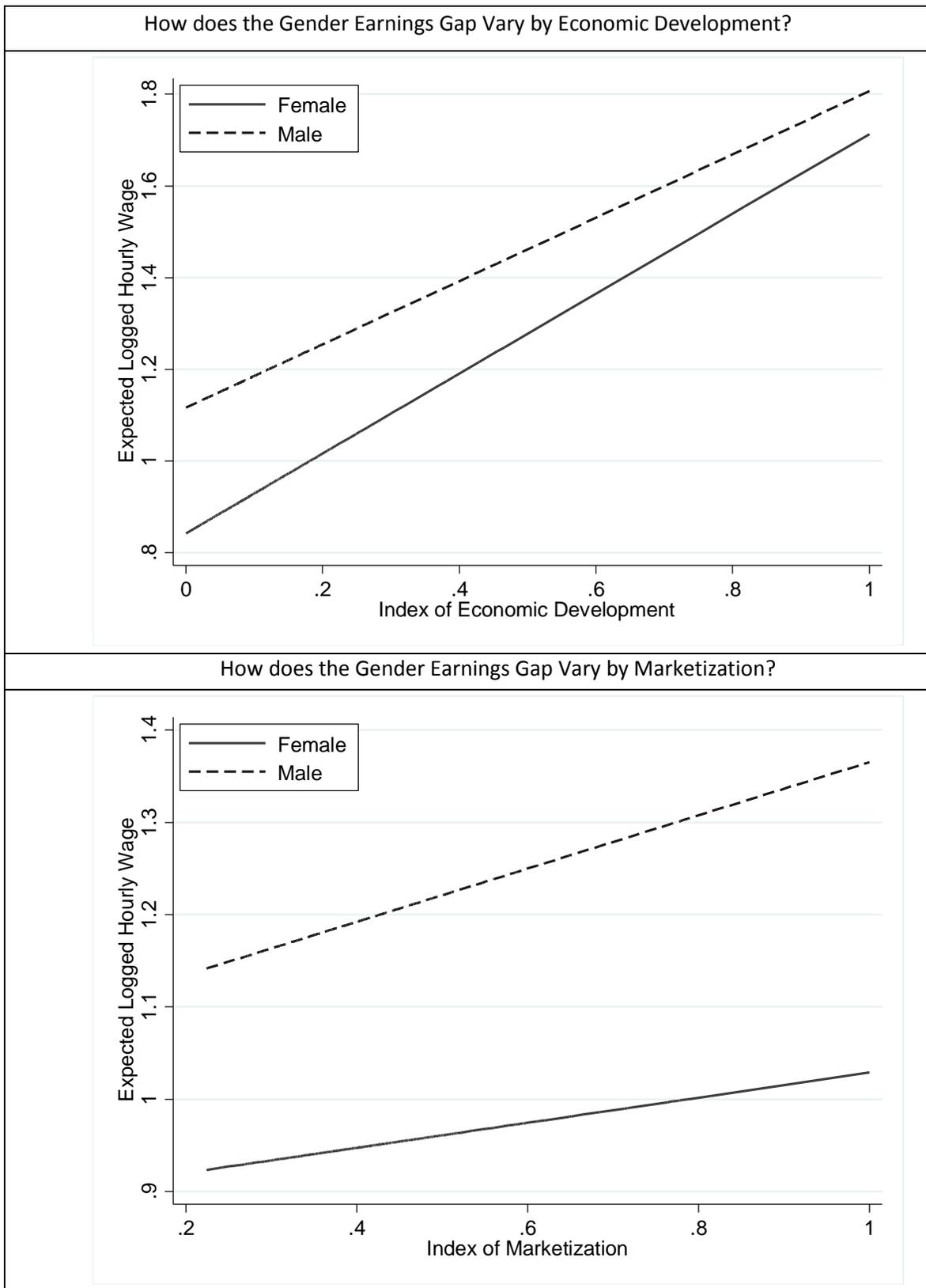
Notes : The figure is based on the results estimated from Model 2 in Table 6.

Conclusion and Discussion

China has been undergoing dramatic social and economic changes over the past three decades. These changes are multi-dimensional and have led to multiple consequences. Explaining this process of change and revealing its complex mechanism represent a great intellectual challenge to contemporary social scientists. The empirical analyses and theoretical debates among sociologists on changing social stratification in China's economic transition account for a large amount of the literature since the 1990s. Recent studies in the field have gone beyond the dichotomous framework (the state vs. the market) in the market transition debate and are no longer limited to the issues on changing returns to human capital and political capital. This article examines the changing trends in gender earnings inequality—an important aspect of social stratification—in the context of macro-level social and economic changes, with special attention paid to the differential impacts in shaping the socioeconomic relationship between men and women in urban China.

We argue that marketization could push women into more marginal positions in labor markets and increase gender earnings inequality, whereas the industrial upgrading and educational expansion that occur along with the economic development could yield positive impact on women's economic status and reduce the gender earnings gap. Given the lack of longitudinal data, we analyzed the sample data from the 2005 China population mini-census to approximate temporal trends with variations across sectors and regions (prefectures), and proposed to test three hypotheses accordingly. Results from the linear regression analyses reveal that, in urban China's labor markets, women continue to be disadvantaged in earnings, even after taking into account their human capital and other social demographics. We also find that gender gaps are smallest in government/public institutions, followed by public enterprises and private enterprises in that order. If the three sectors are seen to form a continuum of marketization, this finding lends support to Hypothesis 1. At the prefectural level, we differentiate the measures of marketization and economic development and examine their respective impact on gender earnings disparities. While both increase individuals' earnings, women and men seem to benefit differently. Multi-level analyses confirm that marketization tends to enlarge gender disparities (Hypothesis 2), whereas economic development could help to reduce inequality between men and women (Hypothesis 3). Once we took into account differential returns to education across

regions, the pattern becomes even more evident. These findings reveal the different mechanisms and processes that create gender inequality in urban China's economic transition.

China's economic development varies dramatically across regions. The differentials in the degree of marketization and economic development can approximate the temporal changes of the entire country. In this sense, the overall trends in gender earnings inequality in urban China are contingent upon the relative sizes of different social forces.[4] The recent trends of increasing gender inequality suggest that marketization is the main agent shaping the pattern of gender stratification in labor markets.

The socialist state has long played a visible and direct role in promoting egalitarianism. As the reform progressed and the redistributive state gradually retreated from the economic sphere giving way to a competitive labor market, those who used to be under the protection of the state egalitarian policies tend to lose out and face greater disadvantages in the labor markets. The predictions are applicable to ethnic minorities (Wu and Song 2014; Wu and He 2014), as well as to women. Women are "losers" in the course of China's market transition. It should be noted that there are government regulations/laws in China to guard against gender discrimination in the labor markets. Therefore, our findings contribute to research on the dynamic process of gender stratification and shed new light on how to promote gender equality in urban China.

While we have identified two kinds of forces shaping gender stratification during the three decades of massive social and economic changes in China, there are other social processes at work at the macro level such as population migration and economic globalization. These processes could also yield profound consequences for gender stratification. Moreover, the meso-level processes through which the macro-level social forces affect gender inequality have yet to be investigated. More empirical analyses are thus needed to understand how marketization and economic development affect women's labor force participation and occupational gender segregation leading to the gender earnings inequality seen in urban China today.

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[4] The finding that there are no temporal trends in gender earnings inequality, as reported by Shu and Bian (2003), may be a result of the counter-balancing effects of different forces on gender stratification, whereas the findings from rural China by Mathews and Nee (2000) may reflect the consequences of economic development instead of marketization for gender inequality.

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