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EXPLAINING THE GENDER WAGE GAP IN RURAL AND URBAN CHINA

BY  
WEI GU

A thesis submitted in partial fulfillment of the requirements for the

Master of Science

Major in Sociology

South Dakota State University

2017

## EXPLAINING THE GENDER WAGE GAP IN RURAL AND URBAN CHINA

This thesis is approved as a creditable and independent investigation by a candidate for the Master of Science in Sociology degree and is acceptable for meeting the thesis requirements for this degree. Acceptance of this does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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## ABSTRACT

## EXPLAINING THE GENDER WAGE GAP IN RURAL AND URBAN CHINA

WEI GU

2017

The gender wage gap is a long-standing and worldwide issue. Since the equality sense towards gender role are difference between rural and urban China, this paper will (1) compare the gender wage gap in rural and urban settings; (2) examine how the associated factors (such as education, occupation, and housework involvements) affect the wage; (3) assess and compare gender discrimination in the rural and urban labor markets.

This paper utilizes the survey data from China Health and Nutrition Survey in 2011. The methods of descriptive statistics, correlation, and stepwise multiple regression models are applied in analyzing the data. The results suggest that: (1) the gender wage gap is larger in rural areas than in urban areas; (2) education has a positive effect on wage, housework involvement has a negative impact on wage, occupation difference is an important factor of wage difference; (3) gender discrimination exists in both rural and urban China, and gender discrimination is stronger in rural areas than in urban areas.



## I. BACKGROUND

### Urban/Rural areas difference and Household Registration System in China

According to the United State Census Bureau, urban areas “represent densely developed territory, and encompass residential, commercial, and other non-residential urban land uses”. A rural area “encompasses all population, housing, and territory not included within an urban area”. The characteristics of urban and rural areas in China are similar with the United States. But the population density in rural China is much higher than that in the U.S. In China, almost half of the population resides rural areas. In U.S., the estimated percentage of population in rural areas only comprised 19% in 2015 (U.S. Census Bureau, 2015 ACS 1-Year Estimates & China National Census Bureau, 2015 Statistical Yearbook)<sup>1</sup>. Moreover, the Chinese government uses the household registration system to identify rural and urban residents. The household registration system, also known as the “HUKOU” system, is used for government to manage and supervise population movement by the registered residence locations. “HUKOU” system assigns either an “urban hukou” or a “rural hukou” to each citizen and includes the information and kinship of each household family member. Moreover, residents can only get the social welfare (e.g. health insurance coverage, free nine-year compulsory education) in the residence locations. As a result, this control system has limited population mobility and increased the difference between Urban and Rural areas in China in terms of economics, education, facilities, cultural and social aspects (Sicular, Yue and Bjorn 2007, Wang 2004).

## II. INTRODUCTION

### i. Gender Wage Gap

The gender wage difference is a long-standing issue worldwide. As indicated in the Global Gender Gap Report in 2015, women and men still do not receive equal pay all over the world. In Asia and The Pacific region, women received 56% to 79% of men's income. In Latin America and the Caribbean region, women's income comprised 66% to 77% of men's income. In the Middle East and North Africa region, women earned 48% to 71% of men's income (World Economic Forum, 2015:14-15). In Asia, the gender pay gap even got worse despite economic growth in recent decades (CNBC news, 2014)<sup>2</sup>. As the largest economic entity in Asia, China's economy and peoples' living standard had a dramatic increase in recent years. Meanwhile, the gender pay difference in China also increased during the past two decades from 1988 to 2009 (Chi and Li 2014). Specifically, by calculating the gender earning gap as the ratio of female's average earning to male's average earning, Chi and Li utilized the China's Urban and Household Survey data and reported that the female to male earning gap ratio decreased from 82% in 1988 to 75% in 2009, which indicated the gender earning gap had increased.

### ii. Gender Role in China

Since male-dominated society has a long history in China, most people have a bias on the gender labor division. Usually, men are expected to have a good career and earn money to support the whole family, while women stay at home doing housework and taking care of family members. For a long time, men, as the bread-winners, have a higher social and economic status than women in China. After the establishment of the People's Republic of China in 1949, the state advocated for the equality between men and women,

and women were encouraged to go out from domestics to participate into works and other social affairs. During the period from 1949 to 1979, the traditional family labor division concept changed considerably and women's labor participation was more than 90% (Croll,1995). Besides, "Chinese central government implemented a system of national wage scales based on the socialist egalitarian principle", so women and men almost got equally paid and the gender earning gap was relatively small during this period (Xiu and Gunderson, 2013a:236).

However, the responsibilities for housework and childcare was still mainly dependent on women rather than men. As income-earner, house-worker and care-giver, women play the multiple roles in the society. Since the limitation of time and energy, women's role as the house worker and the care giver might interfere with the role as the income-earner. Moreover, since the Economic Reform police in 1979<sup>3</sup>, "the centrally-controlled employment system was gradually replaced by a labor contract system. Firms were given more autonomy and discretion in making decisions on recruitment, promotion, layoffs, and termination" (Xiu and Gunderson, 2013a:236). In order to get the maximum benefits, employers showed their preferences to men because women were expected to fulfill multiple roles, while men primarily focused on earning. Therefore, women faced more disadvantage in the labor market (Qi and Dong 2015; Cook and Dong 2011).

### iii. Gender Role in Rural and Urban China

After the Economic Reform policy in 1979, the dramatic development in China made the unbalanced development between urban and rural. Although rural areas were influenced by the modernization and industrialization, these affects experienced far less than in urban areas. Therefore, rural areas retain more traditional social and family

ideology and practice than urban areas in China, such as the patriarchal concepts -- “males are stronger than females” and “men go out to earn money, while women take care of domestic affairs” (Feng and Xiao, 2014). Using the data from The Third Phase Investigation of the Social Status of Women in 2010, Feng and Xiao defined gender role consciousness as “an individual’s equality attitude towards to gender roles”, and they found that the gender role consciousness in rural China toward more traditional than that in urban areas. This finding also indicated that an individual’s sense of gender equality in rural China was not as strong as that of one in urban China. Specifically, Feng and Xiao converted 6 scale variables that measured the gender role consciousness to the 100 scale score, the lower score indicated the more traditional gender role consciousness, and the higher score indicated the more contemporary gender role consciousness. The results presented that the gender role consciousness score in rural China was about 10% less than that in urban China.

### III. CURRENT STUDY

As a long-standing and worldwide issue, the gender wage gap has increasingly drawn the attention of researchers. Previous studies have examined the effects of human capital, occupation segregation, work-family conflict, enterprise ownership, and discrimination in Urban or Rural China (Qia and Dong 2015; Lin and Gunderson 2013; Chen and Hamori 2008; Chang, MacPhail and Dong 2011). This paper will examine the current status and determinants of the gender wage gap in China, particularly, the differences in the gender wage gap between urban and rural areas. There are three objectives: (1) to compare the gender wage gap in rural and urban settings; (2) to examine how the associated factors

(such as education, occupation, housework involvements) affect the wage; (3) to assess the gender discrimination in the Chinese labor market.

#### IV. THEORETICAL FRAMEWORK

##### i. Human Capital

Different from the traditional capital such as stocks, bank account, and property, Human Capital includes schooling, a training course, or even spending on medical care. It is about the ability, skill, knowledge, and even health of human, and those virtual capabilities could produce economic values (Becker 1964:15-16). Schultz claimed that improving human capital has a positive effect on increasing the value of human's productivity, which could assess the individual's efficient of work (1961:8-9). Schultz suggested the wage or salaries increase could reflect the investment of Human Capital.

Schultz (1961) mentioned five main categories that could measure Human Capital improvement, which were: (1) "health facilities and services, broadly conceived to include all expenditures that affect the life expectancy, strength and stamina, and the vigor and vitality of a people"; (2) "on-the-job training, including old-style apprenticeship organized by firms"; (3) "formally organized education at the elementary, secondary, and higher levels"; (4) "study programs notably in agriculture"; (5) "migration of individuals and families to adjust to changing job opportunities". Additionally, Becker (1964) suggested that the two most important investment of Human Capital are education and training. Mincer (1974) thought that the two primary components of Human Capital are schooling and post-school investment, and experience (evaluated by age and the length of schooling) could be utilized to estimate investment on human capital when post-schooling measurement could not be identified.

Although Becker, Schultz and Mincer have different emphases on Human Capital, the primary concepts are the same: Human capital is positively related to earning, and improving the investments on education, working experience, training could increase earnings.

#### ii. Limitations of Human Capital

Olson (2013) and Lips (2012) pointed out the limitation of using Human Capital to explain the gender wage gap. One of the issue is the omitted variables. Additionally, Human Capital can only reflect the individual factors that attributed to the wage. There are other structural components that influence wages as well (Blinder 1973). Besides the education variables, Blinder considered occupational variable as one of the main determinant of the wage. Additionally, Anker (1998:7) considered Occupational segregation as “a major determinant of male/female wage differentials”.

#### iii. Occupational Segregation

Occupational segregation refers to the different concentration of occupational distribution among groups of workers (Bergmann 1974). Gender-based occupational segregation was regarded as the extent of different occupation concentration between male and female (Ganchat et al. 2012). In other words, males and females are separated by different types of occupations. According to Bergmann (1974), women in general have limited access to occupations in the labor market, so women can only concentrate on some occupations. Hence, a large portion of the female labor supply are found in these occupations and the average pay of those occupations decreased. Moreover, since it is difficult for women to get into the male-dominated occupations, the labor supply of these male stereotyped occupations is relatively insufficient. As a result, the payments in male-

dominated occupation are higher than the female stereotyped occupations. Therefore, occupation segregation not only leads to wage gap between different occupations, but also reinforces male and female wage differences. Additionally, Anker (1998) also mentioned that women were more likely to involve in jobs with “low pay, high flexibility, low status and less decision-making authority”, so gender occupation segregation is an important determinant of the gender pay difference.

## V. LITERATURE REVIEW

### i. Gender Wage Difference in China

A number of studies examined gender earning differences in China. A majority of these studies used the urban sample (Chi and Li 2014, Tang and Long 2015, Li et al. 2011, Wang and Cai 2008, Zhang, Han, Liu and Zhao 2008, Démurger, Li and Yang 2012, Li and Dong 2011, Shu and Bian 2003, Hughes and Maurer-Fazio, 2012). A small number of studies included rural areas (Rozelle, Dong, Zhang and Mason 2002, Meng 1995, Dong, Macphail, Bowles and Ho 2004, Chang et al. 2011). Recently, researchers started to consider the difference of the gender earning gap between rural and urban China. Shen and Deng (2008) conducted a critical review of the post-reform research on gender wage inequality. They claimed that the gender wage gap in rural areas was generally larger than that in urban area in China. More specifically, they reported that previous studies found that women earned from 10 to 54 percent less than men in urban China and from 20 to 45.7 percent in rural China.

Moreover, a forthcoming empirical study compared the urban and rural difference on the labor force choice and gender earning gap in the recent decade by using the China Health and Nutrition Survey data in 1997, 2000, 2006, and 2009 (The Gender Wage Gap

in Urban and Rural Labor Force Using China Health and Nutrition Survey Data. Forthcoming). The preliminary results from this study mentioned that the gender wage gap in both urban and rural China were widening and most of the gender wage gap was explained by a discrimination factor.

## ii. Gender Wage Difference Factors

### 1. Human Capital

#### Human Capital, Education and Gender Wage Gap

Among the measurements of Human Capital, education is one of the most commonly used indicators to estimate Human Capital. Moreover, increasing Human capital have a positive effect on earnings (Becker 1964, Schultz 1961, Mincer 1974). As the primary indicator of Human Capital, education positively impact individuals' earnings as well: the more a person is educated, the more that person could earn.

In China, Education is an important determinant of the gender wage gap. Gustafsson and Li (2000) found that women with a lower level of education and in younger ages experienced more disadvantages in earning compared to men who had the same features. Hughes and Maurer-Fazio (2002) also found that education could narrow the gender wage gap. Using the Chinese Labor Market Research Project data which were collected from more than 400 enterprises in 12 provinces, they studied how marital status, education, and occupation affected the gender wage gap in urban areas, and they found that women with higher educational attainment experienced smaller gender wage gap than less educated women. Shu and Bian (2003) utilized the Chinese Household Income Project data from 1988 and 1995 to investigate the changing significance level of Human Capital's effect on gender earning gap in urban China, the Human Capital was measured



by education and years of working experience. They reported that the impact of Human Capital on gender earning gap has increased, which suggested that Human Capital investment in education could decrease the wage gap between men and women.

However, in rural China, men were given more priority to obtain education, and men were treated more favorably compared to women in the rural labor market (Meng, 1995). Meng (1995) utilized the survey, which was conducted by World Bank and the Institute of Economics of the Chinese Academy of Social Sciences, in four rural counties in China in 1986 and 1987 to investigate the wage determination and wage discrimination by gender. The results suggested that education has a positive impact on men's and women's wage in rural China. However, Meng only found this positive impact was only statistically significant on women rather than that of men, and the coefficient on women was two times higher than that of men.

## 2. Occupational Segregation by Gender

In the U.S., gender occupational segregation is one of the factors of the gender wage difference. The more the occupations are unevenly distributed by gender, the larger the gender wage gap (Cotter, DeFiore, Hermsen, Kowalewski and Vanneman 1997). Cauchat, Kelly and Wallace (2012) investigated whether gender occupational segregation could be weakened by globalization and labor market restructuring<sup>4</sup>. The results supported that occupational segregation had the main impact on gender earning difference and its influence was not reduced by introducing globalization into the model.

In urban China, Occupation segregation is also one of the main factors of gender earning difference and the impact of occupational segregation on the gender wage gap even increased (Shu and Bian 2003, Dong et al. 2004). Relying on the data from the

Chinese Household Income Project in 1988 and 1995, Shu and Bian (2003) utilized a trend analysis and a city level cross-sectional comparison to investigate how the gender earning gap and marketization were related to each other. The results indicated that occupational segregation, as a result of marketization in Urban China, had an increasing positive relationship with the gender earning gap. Moreover, Deng and Li (2009) used the three waves of Chinese Household Income Project data in 1988, 1995 and 2002 to examine the extent of personal and employment influences on earning differences in urban China. They reported that the impact of occupation on earning had increased.

Similarly, in rural China, gender occupation segregation is a significant determinant of the gender wage gap. Using the survey conducted by World Bank and the Institute of Economics of the Chinese Academy of Social Sciences in four rural counties in China in 1986 and 1987, Meng and Miller (1995) examined how occupations affected the gender wage difference in rural China and compared the effects in rural China to the developed countries, such as Canada, U.K., U.S., and Australia. They found that gender occupation segregation attributed more explanation to gender wage difference in rural China than in other counties. The gender occupational difference might explained more gender wage gap in urban areas than in rural areas as aforementioned urban China is more developed place than the rural China.

### 3. Time Usage Difference in Household Duties

According to the study of Kahn et al (1964), Greenhaus and Beutell interpreted the work-family conflict is “a form of inter-role conflict in which the role pressures from the work and family domains are mutually incompatible in some respect”. (1985:77). The role of the conflict between work and family in daily life has been associated with

individual earning in some extent in the U.S.. Hennessy (2009) found that holding the traditional gender role views made low-income mothers usually devoted themselves more to motherhood compared to the advantaged mother who prioritized work over than family, which suggested that the decision of the poor and working class women who put child and family first could limit their ability to improve economic conditions. Utilizing the 1996 Indiana Quality of Employment Survey, Shirley and Wallace (2004) examined the gender and classes' earning difference, which was influenced by housework and family characteristics. They pointed out that time spending on housework had a larger negative effect on women's earning than men's. Gupta (2006) studied how time cost on domestic works impact the earning of women by analyzing the second wave of the National Survey of Families and Households. Similar to Shirley and Wallace's findings, Gupta reported that the negative associations of women's earning with housework hour was two to three times stronger than that of men.

Individuals' time use in primary activities could be divided into three main categories - paid work, unpaid care work, non-work activities (Qi and Dong, 2015). Based on the China Time Use Survey data in 2008, Qi and Dong suggested that unpaid care had negative influence on the earnings of both men and women, but women's earning were more likely to be interrupted by unpaid work and women spent more time on unpaid work than men.

Therefore, women experienced more negative effects from providing unpaid care, and these unpaid work as house keeper and care giver to family members enlarged the gender earning gap. It also indicates that time spent on house work and taking care of family members conflicted with getting economic benefits and advancement from work.

In urban China, most literature supported that time spending on housework had negative effects on earnings, especially on women's earning (Zhang, Hannum, and Wang 2008, Zhang and Dong 2008, Xiu and Gunderson 2013b). Married women and mothers faced more significant disadvantages than single women and mother without child on earnings in work place since they were those who spent most time on housework and taking care of children (Zhang et al. 2008). Additionally, the married group had larger gender wage gap than the unmarried or single group (Hughes and Maurer-Fazio 2002).

In rural China, the lack of adequate and affordable child care center force women to spend more time taking care of children, and the time usage conflict between work and taking care of children influenced women's income and personal well-being (Cook and Dong, 2011). More importantly, women in rural areas may take more responsibility of domestic duties than that of in urban as Feng and Xiao (2014) mentioned that the traditional attitude of gender role is more serious in rural China. Chang et al. (2011) analyzed the China Health and Nutrition Survey data in 1989, 1991, 1997, 2000, 2004, 2006 and studied the changes of time use patterns based by gender in rural China. They pointed out that women's time spent on both paid work and unpaid domestic work had grown in rural areas. The increasing pattern of time use on domestic work might have a negative effect on women's earning in rural China according to the finding that time spending on housework had negative effect on earning (Shirley and Wallace 2004, Gupta 2006).

#### 4. Urban/Rural Areas Difference

Feng and Xiao's aforementioned study indicated the unbalanced development between urban and rural areas launched urban areas far ahead of rural areas in terms of economic

development, education, facilities, cultural and social aspects in China (2014). For instance, the urban residents' income were 2.75 times that of rural in 2014 (China Statistical Yearbook, 2014). The urban-rural income gap (urban to rural ratio close to 3.0) was larger than other Asian countries (Eastwood and Lipton 2004, Sicular et al. 2007). Therefore, the wage might vary by region and individuals' earning in rural areas might be lower than that in urban areas.

## VI. HYPOTHESIS

Previous studies have found Human Capital is positively related to earning, while time spent on housework is negatively associated with earning. Additionally, occupation segregation had an increasing impact on the widening gender earning gap. Based on previous studies on the gender wage gap and the gender wage gap difference in urban and rural China, the hypotheses of this study are presented below.

1. The gender wage gap exists in both urban and rural China.
2. The gender wage gap in rural areas is larger than it is in urban areas.
3. Education has a positive impact on wages.
4. Household work involvement has a negative influence on wages, by controlling working hours.
5. Gender occupational distribution difference is a significant factor of gender wage difference, which is reflected by the higher proportion of women in low income occupations.
6. The gender wage gap exists after controlling demographic variables, education, working hour, involvement in domestic work, and occupations, which suggests the presence of gender discrimination.

6a. The gap is wider in rural areas than it is in urban areas after controlling explanatory variables, suggesting the presence of gender discrimination is stronger in rural than that in urban.

## VII. DATA

The China Health and Nutrition Survey (CHNS) is an ongoing project organized by the Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute for Nutrition and Health in China (NINH, former National Institute of Nutrition and Food Safety). The CHNS collects individual data on income, job, education, time use, and geographies for studying gender wage differences in China. The survey was conducted by an international team of researchers from sociology, economics, nutrition, public health, Chinese studies, and demography. The survey took place in the past 9 times and collected data through a multistage data collection process. It drew a sample of 30,000 individuals in 7,200 household with a random cluster process in 15 provinces in China during the past 20 years (1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011). Additionally, detailed community data on food markets, health facilities, family planning officials, and other social services and community leaders are available. This paper will only use the latest year data (2011).

The final data of this paper includes 3997 observations, after excluded individuals who were not in labor force. Specifically, the observations that men under 16 years old and over 60 and women under 16 years old and over 55 years old were excluded, since the normal retirement age for women and men are 55 and 60 years old respectively and the legal working age is over 16 years old in China. Moreover, who reported “not working presently” as working status were drop from the sample and who reported their

employment status as self-employed, retired but rehired were excluded, since they are not in the normal labor force market. Additionally, whose primary occupation is Athlete, Actor, Musician, Soldier, Army officer or policeman were also excluded in this study because those are the special occupations and the total observations of those occupation are small in the current sample (only 35 individuals). Moreover, observations with missing value in individual wage (N=1446) and gender (N=590) were dropped as gender is the main variable of current research.

## VIII. METHEDS

### i. Operationalization and Measurement

#### 1. Human Capital

As mentioned before, education is one of the most commonly used indicators to measure Human Capital, and it has a positive impact on earnings. Usually, the higher education lever means more accumulated Human Capital, so the years of education could be an indicator of Human Capital. It is hypothesized that more education is associated with higher wage income.

#### 2. Time Usage

Previous studies have indicated that unpaid work on family has a negative effect on earnings, especially the earnings of women. In other words, time spent on family conflicts the advancement in economic attainment from paid work. According to Qi and Dong (2015), unpaid family related working time includes time spent on housework and taking care of family members. Therefore, this study measure the work-family conflict by sum the value of following five items of status on domestic duties involvements: buying food, cooking food, washing clothes, cleaning, taking care of children. Responses were 0

(not involved) or 1 (involved). The higher the numerical score on domestic duties involvement, the more the respondent involved into family related tasks. The value of Cronbach's Alpha for this scale is 0.8, which presented a high reliability.

### 3. Occupational Difference

According to the official occupation classification published in the P.R. of China in 1999, occupations are divided into 8 categories in China. There are: 1. Administrator, executive and manager; 2. Professional and technical; 3. Office staff; 4. Service worker; 5. Farming, Forestry, Animal Husbandry, Fishing and Water Conservancy; 6. Manufacturing and transport worker; 7. Soldier; 8. Others. Integrating the occupations in China Health and Nutrition Survey, the occupation type used in current analysis will be classified into below 6 categories according to the official occupation classification and occupation ranking.

- 1) Group 1 is "Senior Professional and Manager," which includes Senior Professional; Administrator, Executive and Manager.
- 2) Group 2 is "Junior Professional and Officer," which represents Junior Professional and Office Staff;
- 3) Group 3 is "Skilled Workers", which represents Driver and Skilled Worker.
- 4) Group 4 is "Normal Workers," which includes Non-skilled Workers and Service worker.
- 5) Group 5 is "Farmer, Fisherman, Hunter".
- 6) Group 6 is "Others," the residual group.



#### 4. Gender Discrimination

According to Meng and Miller 1995, Rozelle et al. 2002, Shen and Deng 2008, Zhang et al. 2008, Ng 2007, Shi and Liu 2011, Xiu and Gundersen 2013a, Yao and Long 2013, there was a comparatively large part of gender wage gap that could not be explained by the known factors after controlling all the wage determinants in each study. Those economists considered that the unexplained parts came from gender discrimination. Similar to their method, this study measures the existence of discrimination through the coefficient of “Gender” variable in the full regression model. If the coefficient is not equals to 0 and statistically significant after controlling all the other indicators, then it means the wage of female significantly less than the wage of male regardless of all the other indicators. This could reflect that the gender discrimination exists in the Chinese labor market. In addition, if the gender wage gap is statistically significant larger in one region than the other region after controlling all other explanatory variables, then it suggests that the gender discrimination is stronger in the labor market of this region than others.

##### ii. Variables

###### 1. Dependent Variables

The dependent variable is log transformed individual annual wage, which writ as “ln(indwage)”. The variable “indwage” is individual annual income from work. More specifically, it includes annual wage, bonus and other income of the job. Most economic studies used hourly wage to analyze the gender wage difference in China. The reason why this paper utilizes annual wage rather than hourly wage is that the 2011 data only have average number of hours worked by last week or average hours worked per day in

last year, so the working hours may be different in different weeks in one year. It is not accurate to calculate hourly wage based on those two working hour variables. As working hours might affect the wage, especially the people worked as hourly paid work.

Therefore, the variable - “average working hours per day in last year” will be added as the independent control variable.

## 2. Independent Variables

As mentioned in literate review, previous studies have found that education had a positive effect on individual’s earning, but gender difference on education was not that obvious. Additionally, household work involvement had a negative impact on personal earnings, and this influence was more serious for women than men. Moreover, occupational difference was also a factor of individual’s earning difference and it played an important role to explain earning difference between men and women. Individual’s wage also different by gender and region. Therefore, the independent variables are gender, region, years of education, household involvement, occupations and demographic information. As mentioned in the above paragraph, the working hours will be treated as the control variable. Among all those variables, gender is the main interested independent variable.

### iii. Analytic Steps

#### 1. Data Integrating and Cleaning

The CHNS data were organized by 20 topics in 20 different folders (e.g. ID folder, Income Categories folder, Education folder, Time Use folder etc.). In these folders, each one included several datasets and each dataset combined data from multiple years (1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011). To start, the datasets needed for this

study were selected from 20 folders. Then, the data of the resent year (2011) were kept after dropping all other years. After that, these data sets were merged into one master dataset by the ID number of each observation.

## 2. Descriptive Data and Significant Tests

The descriptive statistics give an overview of the 2011 CHNS data. After integrating and clean the data, the interested variables (e.g. average years of education, average time use for taking care of children, occupation distribution) were described by descriptive statistics. Also, these variables were compared by gender and areas. For example, the population proportion by the categories such as gender, urban and rural, occupation. In order to study whether the comparison descriptive statistics were significant, T-test and Chi-square test were conducted to look at whether there is significance difference between two groups. For instance, Chi-square test of the proportion of occupational distribution by gender could know whether the occupational distribution of men and women are significantly different. T-test of the education year by gender could know whether man and women's education level are significantly different.

## 3. Correlation

Correlation analysis is an appropriate way to figure out the relationship between two variables. This paper will apply correlation analysis to explore both males' and females' relationship between household duties involvement and earning.

## 4. Stepwise Multiple Ordinary Least Squares Regression Model

To test the relationship between wage and multiple factors (e.g. gender, areas, years of education, domestic duties involvement, and occupations) and to analyze each factors' explanation power on wage, Multiple Ordinary Linear Regression Models will be

utilized. Additionally, to compare the gender wage in urban China and rural China, an interaction term of gender and region were added to the model.

Furthermore, a stepwise regression method will be applied, which includes three models in three steps. In all steps, the outcome variable is the same, which is “ln (indwage)”, the primary interest variable is “gender”. The result of stepwise regressions will indicate how gender effects wages with three different sets of independent variables: (1) working hours and demographics; (2) working hours, demographics, and wage determinants; (3) working hours, demographics, wage determinants, and gender-region interaction. The outcome variable is the,

Model 1:

$$\ln(\text{wage}) = \beta_1 X_{\text{gender\_f}} + \beta_2 X_{\text{hour}} + \beta_3 X_{\text{age}} + \beta_4 X_{\text{mt}} + \alpha.$$

Model 2:

$$\ln(\text{wage}) = \beta_1 X_{\text{gender\_f}} + \beta_2 X_{\text{hour}} + \beta_3 X_{\text{age}} + \beta_4 X_{\text{mt}} + \beta_5 X_{\text{edu}} + \beta_6 X_{\text{ocu2}} + \beta_7 X_{\text{ocu3}} + \beta_8 X_{\text{occu4}} + \beta_9 X_{\text{occu5}} + \beta_{10} X_{\text{occu6}} + \beta_{11} X_{\text{house}} + \beta_{12} X_{\text{region\_r}} + \alpha.$$

Model 3:

$$\ln(\text{wage}) = \beta_1 X_{\text{gender\_f}} + \beta_2 X_{\text{hour}} + \beta_3 X_{\text{age}} + \beta_4 X_{\text{mt}} + \beta_5 X_{\text{edu}} + \beta_6 X_{\text{ocu2}} + \beta_7 X_{\text{ocu3}} + \beta_8 X_{\text{occu4}} + \beta_9 X_{\text{occu5}} + \beta_{10} X_{\text{occu6}} + \beta_{11} X_{\text{house}} + \beta_{12} X_{\text{region\_r}} + \beta_{13} X_{\text{gender*region}} + \alpha.$$

In model 1(the base model), the independent variables are gender (as a wage indicator), demographic information and working hours (as the control variables). The results of model 1 will indicate first whether the wages of women and men are

significantly different, and if they are, the coefficient will determine the size of the gender wage gap by controlling working hours and demographics.

In model 2, other wage indicators (education, occupation, time usage, and region) are added as explanatory variables based on model 1. Comparing to the results from model 1, the results of model 2 will indicate whether wages of women and men are still significantly different and whether the size of the gender wage gap decline. After adding the wage determinants into model, the size of gender wage gap may decrease.

In model 3, the interaction term “gender and region” is introduced based on model 2. The results of model 3 will indicate that whether wages of women and men are different in both rural areas and urban areas, and the size difference between the gender wage gaps in rural areas and urban areas. By controlling all the other indicators, rural areas may have a larger gender wage gap compared to urban areas.

The coefficient of gender variable could reflect gender wage gap in each model. In model 1, the coefficient of gender variable “ $\beta_1$ ” reflects the size of the gender wage gap by controlling demographics and working hours. In model 2, the coefficient of gender variable “ $\beta_1$ ” also reflects the size of the gender wage gap by controlling demographics, working hours and wage indicators. In model 3, the size of the gender wage gap in urban China is determined by the coefficient of gender variable “ $\beta_1$ ”, while the size of the gender wage gap in urban China is determined by the coefficients of gender variable “ $\beta_1$ ” and the coefficient of interaction term “ $\beta_{13}$ ”. Next, the interpretation of coefficients will be discussed.

Above analytical steps were all operated in Stata.

iv. Interpretation

1. Gender Wage Gap

Using “R(gender)” to represent the wage ratio of women to men, then “R(gender)” means the times of women’s wage to men’s wage. “R-1” is utilized to measure the size of gender wage gap [represented as “G(gender)”] in this paper. It can be represented as below formula:

$$R(\text{gender}) = W_F / W_M,$$

$$G(\text{gender}) = (R-1)$$

Where,

R = the wage ratio of one group to another group;

G = the size of wage gap of one group to another group;

$W_F$  = average wage of females;

$W_M$  = average wage of males.

If  $G(\text{gender}) = 0$ , then there is no wage difference between men and women;

If  $G(\text{gender}) < 0$ , then the wage of women is lower than men. The lower the value, the smaller the gap; the greater the value, the larger the gap;

If  $G(\text{gender}) > 0$ , then the wage of women is higher than men. The lower the value, the smaller the gap; the greater the value, the larger the gap.

## 2. The Coefficient of Independent Variables When the Outcome Variable is Log Transformed<sup>5</sup>

### 1) Continuous Independent Variable (e.g. Years of Education)

Using (1) to represent the wage equation when the education with no change, and (2) as the wage equation when the education with 1 year increase. Then, the wage ratio of “wage2” (when education with 1 year increase) to “wage1” (when education with no increase) equals “ $e^{\beta_5}$ ” while holding other dependent variables constantly as (3) presented. Equation (4) means the size of wage difference between individuals with one year education increase to the person without education increase. Therefore, the interpretation of continuous variables can be explained as follows. While keeping all the other independent variables as constant, the individuals’ wage with one more year education is “ $e^{\beta_5}$ ” times of the person’s wage without education increase. Or, every one year education increase leads to “ $(e^{\beta_5}-1) * 100$ ” percentage decline or growth on wage. If the value of “ $(e^{\beta_5}-1) * 100$ ” is negative, then the education increase leads to wage decline. If the value of “ $(e^{\beta_5}-1) * 100$ ” is positive, then the education increase one year causes to wage growth.

$$\begin{aligned} \text{Ln}(\text{wage1}) = & \beta_1 X_{\text{gender\_f}} + \beta_2 X_{\text{hour}} + \beta_3 X_{\text{age}} + \beta_4 X_{\text{mt}} + \beta_5 X_{\text{edu}} + \beta_6 X_{\text{ocu2}} \\ & + \beta_7 X_{\text{ocu3}} + \beta_8 X_{\text{occu4}} + \beta_9 X_{\text{occu5}} + \beta_{10} X_{\text{occu6}} + \beta_{11} X_{\text{house}} + \beta_{12} X_{\text{region\_r}} \\ & + \alpha. \end{aligned} \text{-----}(1)$$

$$\begin{aligned} \text{Ln}(\text{wage2}) = & \beta_1 X_{\text{gender\_f}} + \beta_2 X_{\text{hour}} + \beta_3 X_{\text{age}} + \beta_4 X_{\text{mt}} + \beta_5 (X_{\text{edu}} + 1) + \\ & \beta_6 X_{\text{ocu2}} + \beta_7 X_{\text{ocu3}} + \beta_8 X_{\text{occu4}} + \beta_9 X_{\text{occu5}} + \beta_{10} X_{\text{occu6}} + \beta_{11} X_{\text{house}} + \\ & \beta_{12} X_{\text{region\_r}} + \alpha. \end{aligned} \text{-----}(2)$$

$$R = \text{Wage2} / \text{Wage1} = e^{\beta_5 (X_{\text{edu}} + 1) - \beta_5 X_{\text{edu}}} = e^{\beta_5} \text{-----}(3)$$

$$G = [(Wage_2 / Wage_1) - 1] * 100 = (e^{\beta^5} - 1) * 100 \text{-----}(4)$$

- 2) Categorical Independent Variable (e.g. Female V.S Male, without interaction in Model 2)

Utilizing (5) to represent the wage equation for females, and (6) as the wage equation for males. Then, the wage ratio of “wage\_f” (gender as female) to “wage\_m” (gender as male) equals “ $e^{\beta^1}$ ” while holding other dependent variables constantly as (7) presented. Equation (8) means the size of wage difference between women and men – gender wage gap. Therefore, the interpretation of categorical variables can be explained as follows. While keep all the other independent variables as constant, women receive “ $e^{\beta^1} * 100$ ” percent of what men receive. Or, women earn “ $(e^{\beta^1} - 1) * 100$ ” percentage less or more than that of men. If the value of “ $(e^{\beta^1} - 1) * 100$ ” is negative, then the women paid less. If the value of “ $(e^{\beta^1} - 1) * 100$ ” is positive, then the women paid more.

$$\begin{aligned} \text{Ln}(\text{wage}_f) = & \beta_1 \mathbf{X}(\text{gender}=1) + \beta_2 \text{Xhour} + \beta_3 \text{Xage} + \beta_4 \text{Xmt} + \beta_5 \text{Xedu} + \\ & \beta_6 \text{Xocu2} + \beta_7 \text{Xocu3} + \beta_8 \text{Xoccu4} + \beta_9 \text{Xoccu5} + \beta_{10} \text{Xoccu6} + \beta_{11} \text{Xhouse} + \\ & \beta_{12} \text{Xregion}_r + \alpha \text{-----}(5) \end{aligned}$$

$$\begin{aligned} \text{Ln}(\text{wage}_m) = & \beta_1 \mathbf{X}(\text{gender}=0) + \beta_2 \text{Xhour} + \beta_3 \text{Xage} + \beta_4 \text{Xmt} + \beta_5 \text{Xedu} + \\ & \beta_6 \text{Xocu2} + \beta_7 \text{Xocu3} + \beta_8 \text{Xoccu4} + \beta_9 \text{Xoccu5} + \beta_{10} \text{Xoccu6} + \beta_{11} \text{Xhouse} + \\ & \beta_{12} \text{Xregion}_r + \alpha \text{-----}(6) \end{aligned}$$

$$R(\text{gender}) = \text{Wage}_f / \text{Wage}_m = e^{\beta^1} \text{-----}(7)$$

$$G(\text{gender}) = [(\text{Wage}_f / \text{Wage}_m) - 1] * 100 = (e^{\beta^1} - 1) * 100 \text{-----}(8)$$



- 3) Categorical Independent Variable with Interaction (e.g. Comparing the Gender wage gap in Rural and Urban in Model 3)

When Region = 1(rural areas),

$$\begin{aligned} \text{Ln}(\text{wage}_f) = & \beta_1\mathbf{X}(\text{gender}=1) + \beta_2\text{Xhour} + \beta_3\text{Xage} + \beta_4\text{Xmt} + \beta_5\text{Xedu} + \\ & \beta_6\text{Xocu2} + \beta_7\text{Xocu3} + \beta_8\text{Xoccu4} + \beta_9\text{Xoccu5} + \beta_{10}\text{Xoccu6} + \beta_{11}\text{Xhouse} + \\ & \beta_{12}\text{X}(\text{region}=1) + \beta_{13}\mathbf{X}(\text{gender}=1*\text{region}=1) + \alpha. \end{aligned}$$

$$\begin{aligned} \text{Ln}(\text{wage}_m) = & \beta_1\mathbf{X}(\text{gender}=0) + \beta_2\text{Xhour} + \beta_3\text{Xage} + \beta_4\text{Xmt} + \beta_5\text{Xedu} + \\ & \beta_6\text{Xocu2} + \beta_7\text{Xocu3} + \beta_8\text{Xoccu4} + \beta_9\text{Xoccu5} + \beta_{10}\text{Xoccu6} + \beta_{11}\text{Xhouse} + \\ & \beta_{12}\text{X}(\text{region}=1) + \beta_{13}\mathbf{X}(\text{gender}=0*\text{region}=1) + \alpha. \end{aligned}$$

$$\text{R}(\text{gender in rural}) = \text{Wage}_f / \text{Wage}_m = e^{\beta_1 + \beta_{13}} \text{-----}(9)$$

$$\text{G}(\text{gender in rural}) = [(\text{Wage}_f / \text{Wage}_m) - 1] * 100 = (e^{\beta_1 + \beta_{13}} - 1) * 100 \text{-----}(10)$$

According to the equation derivation of the gender wage gap in rural areas, the wage ratio of female to male and gender wage gap in urban areas (region=0) can be represented as below:

$$\text{R}(\text{gender in urban}) = \text{Wage}_f / \text{Wage}_m = e^{\beta_1} \text{-----}(11)$$

$$\text{G}(\text{gender in urban}) = [(\text{Wage}_f / \text{Wage}_m) - 1] * 100 = (e^{\beta_1} - 1) * 100 \text{-----}(12)$$

So, the size of the gender wage gap difference can be calculated as equation (10)-(12), which is:

$$\begin{aligned} \text{G}(\text{gender in rural}) - \text{G}(\text{gender in urban}) = & [(e^{\beta_1 + \beta_{13}} - 1) - (e^{\beta_1} - 1)] * 100 = (e^{\beta_1 * e^{\beta_{13}}} - \\ & e^{\beta_1}) * 100 = e^{\beta_1} * (e^{\beta_{13}} - 1) * 100 \text{-----}(13) \end{aligned}$$

The interpretation on the gender wage gap difference in rural China and urban China can be explained as follows. While holding all the other independent variables as constant, the size of gender wage gap in rural China is “ $e^{\beta_1} * (e^{\beta_{13}} - 1) * 100$ ” percent larger or smaller than that of urban China. If the value of “ $e^{\beta_1} * (e^{\beta_{13}} - 1) * 100$ ” is positive, then the gender wage gap is larger in rural China than urban China. If the value of “ $e^{\beta_1} * (e^{\beta_{13}} - 1) * 100$ ” is negative, then the gender wage gap is smaller in rural China than urban China.

## IX. RESULTS

### i. Descriptive Statistics

#### 1. Sample Distribution

Table 1 presents the sample distribution and information on marital status, occupation, housework involvement by gender and urban/rural division. Table 1 shows average ages, years of education, household tasks involvement by gender and urban/rural division as well. Among 3997 respondents, 57.7% were male and 42.3% were female. The average age was 41 years old, and the mean age of men is a bit older than women. Among the total sample, 89.5% of individuals were married, and respondents in rural areas has a higher proportion of being married (90.3%) than that of urban (84.0%). On average, the sample had about 11 years of education which is about high school level. Interestingly, women received significantly 0.3 years more education than that of men. In urban China, women received significantly 0.4 years more education than that of men as well. However, in rural China, women did not receive more years of education than that of men.

Among all the housework (including buying food, preparing food, washing cloth, cleaning house and taking care of children), women had much higher proportions of

involvement than men. Women in rural areas had more involvement of household tasks than women in urban areas. However, men in rural areas had lower involvement of household tasks than women in urban areas. Moreover, women took significantly 2 more kinds of household tasks than that of men, so gender difference in housework involvement was larger in rural areas than urban areas.

Looking into the occupational distribution by gender, occupations like Senior Professional and Manager, Junior Professional and Officer, Normal Workers, Farmer, Fisherman, Hunter had large proportions of women. Both men and women had high proportion of individuals who worked as Senior Professional and Manager (25.4% V.S 27.8%) and Normal Workers (28.2% V.S 35.6%). Interestingly, women had higher proportion of individuals who worked as Senior Professional and Manager than that of men. Men had much higher percentage who were employed as Driver and Skilled Worker (22.6% V.S 6.9%). In rural China, not surprisingly, more people (over 16%) worked as Farmer, Fisherman, Hunter than that of urban China (2.7%). The highest proportion of occupation was Normal Workers (35.6%) in rural areas. In urban China, most of residents (32.3%) worked as Senior Professional and Manager.

Table 1. The Sample Distribution and Information on Marital Status, Occupation, Housework Involvement by Gender and Urban/Rural Division

Variables	Total	Percentage							
		Men	Women	Urban	Rural	Urban		Rural	
						Men	Women	Men	Women
Observations	3997	57.7%	42.3%	47.4%	52.6%	56.5%	43.5%	58.8%	41.2%
<b>Marital Status</b>									
Married	87.4%	88.0%	86.5%	84.0%	90.3%	85.7%	81.8%	89.9%	90.9%
Not Married	12.6%	12.0%	13.5%	16.0%	9.7%	14.3%	18.2%	10.1%	9.1%
<b>Age</b>	41	43	39	41	42	43	38	44	40
<b>Years of Education</b>	11.2	11.1	11.4	12.3	10.2	12.1	12.5	10.2	10.2
T-test		0.3*		2.1***		0.4**		0.0	
<b>Occupations</b>									
Senior Professional and Manager	26.4%	25.4%	27.8%	32.3%	21.1%	29.9%	35.5%	21.6%	20.5%
Junior Professional and Officer	11.6%	9.0%	15.2%	14.3%	9.2%	11.5%	18.0%	6.9%	12.6%
Skilled Workers	16.0%	22.6%	6.9%	14.9%	17.0%	22.9%	4.4%	22.2%	9.4%
Normal Workers	31.3%	28.2%	35.6%	29.5%	32.8%	26.7%	33.3%	29.4%	37.7%
Farmer, Fisherman, Hunter	9.9%	10.2%	9.6%	2.7%	16.4%	2.9%	2.4%	16.4%	16.4%
Others	4.8%	4.7%	4.9%	6.2%	3.5%	6.0%	6.5%	3.6%	3.4%
Chi2 Test		197.6***		274.3***		131.0***		78.0***	
<b>Involved in Housework (last week)</b>									
Buying Food	56.30%	43.3%	74.2%	50.0%	47.3%	45.3%	73.2%	41.5%	75.2%
Preparing Food	48.50%	32.6%	70.3%	48.0%	46.1%	38.0%	65.5%	28.0%	74.9%
Washing Clothes	47.00%	21.4%	82.0%	54.4%	51.5%	25.5%	77.2%	17.8%	86.4%
Cleaning House	52.90%	30.8%	83.0%	57.3%	55.4%	34.8%	80.0%	27.3%	86.0%
Cared for Children	16.60%	14.00%	20.1%	15.3%	17.8%	13.7%	17.4%	14.2%	22.7%
<b>Number of housework involved</b>	2.2	1.4	3.3	2.2	2.2	1.6	3.1	1.3	3.5
T-test		1.9***		0.0		1.6***		2.2***	

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

## 2. Wage Difference

Table 2 presents average wage by occupation, gender, and urban/rural division. On average, individuals earn RMB 28,658 in 2011. Mean wages of reported occupations had a wide range. From high to low of the annual wage, they were Senior Professional and Manager (RMB 42,081); Junior Professional and Officer (RMB 35,741); Skilled Workers (RMB 29,264); Normal Workers (RMB 21,674); Farmer, Fisherman, Hunter (RMB 8,788), respectively. Recall gender differences in occupational distribution, women had higher percentage in the high earning occupations which were Senior Professional and

Manager and Junior Professional and Officer. But women also had much low proportion working as the middle level paid occupation – Skilled Workers.

In the year of 2011, the average earning of women was 84% of that of men and women. The wage gap was RMB 4,965. The average earning difference between rural and urban was larger than the gender wage difference. Specifically, average earning in rural areas was 71% of that in urban and the mean earning in rural China was significantly RMB 9,713 less than urban China in China. In rural China, the gender wage gap was more serious and women got 74% of the earning of men. While this gap in urban China was less than the average level, women's earning was 91% of men's. The earning in rural areas was 71% of that in urban and the mean earning in rural China was significantly RMB 9,713 less than urban China, which became the most obvious wage gap in all comparisons. More importantly, women paid less than men crossing all the occupations in both rural and urban China except the Farmer Fisherman Hunter in urban areas. Specifically, women received RMB 4,440 less than men in Senior Professional and Manager (with significance level at 0.08); RMB 4,160 less in Junior Professional and Officer; RMB 9,056 significant less in Skilled Workers; RMB 4,933 significant less in Normal Workers; RMB 3,765 significant less in Farmer, Fisherman, Hunter; RMB 11,562 significant less in the other occupations.

Table 2. Average Wage by Occupation, Gender, and Urban/Rural Division

	Average Wage by Occupations						
	Average wage	Senior Professional and Manager	Junior Professional and Officer	Skilled Workers	Normal Workers	Farmer, Fisherman, Hunter	Others
<b>Total</b>	<b>¥28,658.2</b>	<b>¥42,081.0</b>	<b>¥35,741.4</b>	<b>¥29,263.7</b>	<b>¥21,674.8</b>	<b>¥8,787.8</b>	<b>¥27,973.1</b>
<b>By Gender</b>							
Men	¥30,758.8	¥44,057.8	¥38,030.6	¥30,914.2	¥24,031.4	¥10,314.7	¥32,954.7
Women	¥25,793.5	¥39,618.0	¥33,870.2	¥21,828.0	¥19,098.1	¥6,550.1	¥21,392.5
Ratio	0.84	0.90	0.89	0.71	0.79	0.64	0.65
Gap	-0.16	-0.10	-0.11	-0.29	-0.21	-0.36	-0.35
T test	4965.3***	4439.7 <sup>0.08</sup>	4,160.4	9056.2***	4933.3***	3764.5**	11562.2*
<b>By Urban and Rural</b>							
<b>Urban</b>	¥33,766.2	¥47,869.7	¥35,318.5	¥30,031.4	¥24,158.6	¥9,201.7	¥31,003.7
Men	¥35,208.6	¥49,944.2	¥35,789.1	¥31,139.4	¥26,437.1	¥7,901.2	¥35,895.9
Women	¥31,895.4	¥45,576.8	¥34,923.1	¥22,370.3	¥21,760.7	¥11,323.7	¥25,076.7
Ratio	0.91	0.91	0.98	0.72	0.82	1.43	0.70
Gap	-0.09	-0.09	-0.02	-0.28	-0.18	0.43	-0.30
T test	3313.3*	4,367.4	866.0	8769.1 <sup>0.056</sup>	4676.4*	-3,422.5	10,819.2
<b>Rural</b>	¥24,053.2	¥34,240.5	¥36,322.1	¥28,663.0	¥19,687.7	¥8,727.3	¥23,198.8
Men	¥26,906.6	¥37,087.0	¥41,221.4	¥30,715.3	¥22,169.2	¥10,685.2	¥28,743.4
Women	¥19,980.6	¥29,913.7	¥32,466.2	¥21,633.9	¥16,890.3	¥5,902.4	¥14,786.2
Ratio	0.74	0.81	0.79	0.70	0.76	0.55	0.51
Gap	-0.26	-0.19	-0.21	-0.30	-0.24	-0.45	-0.49
T test	6926.0***	7173.3*	8755.1	9081.4**	5278.9***	4782.7***	13957.2*
Ratio of Urban and Rural	0.71						
Gap of Urban and Rural	-0.29						
T test of Urban and Rural	9713.0***						

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

## ii. Correlation Analysis

Table 3 shows the correlation analysis results of household work involvement and  $\ln(\text{wage})$  by gender. It suggests that females' wages negatively related to household duties involvement and that relationship is statistically significant, while males' wage, were not significantly associated with household duties involvement.

Table 3. Correlation of Wage and Household Work by Gender

	Lnwage	Sig.
Male		
Household Work Involvement	0.014	0.499
Female		
Household Work Involvement	-0.165	< 0.001

### iii. Stepwise Regression Model

Table 4 demonstrates the regression results of the stepwise regression models. In model 1 (the base model), the independent variables are gender (as primary interested variable), demographic information and working hour (as the control variables). Based on model 1, other wage indicators (education, occupation, time usage, regions) are added as explanatory variables in model 2. Based on model 2, the interaction term “gender and region” is introduced into model 3. In model 1, independent variables only explained 9% of the variance on  $\ln(\text{wage})$ . After adding the wage determinants, a greater percentage of the variance on  $\ln(\text{wage})$  was explained by all of the independent variables in model 2 ( $R^2=38\%$ ). In model 3, the  $R^2$  remained around 38%, which suggests that the interaction term did not influence the proportion reduction error.

The results of model 1 suggest that the female wage was significantly 24.35% less than the male wage by controlling the age, marital status, and working hours. However, females and males may have different characteristics in wage determinants (education, occupations, household involvements and regions), and those difference could cause the gender wage difference as well. By considering those wage determinant variables into the model, the size of gender wage gap might reduce or disappear

The next step was to adding the wage indicators in model 2, which suggests that education is positively related to wage. Specifically, a one year increase in education associated with a 6.72% increase in wage while holding all the other variables constant in this model. Additionally, Household duties involvement negatively affected wage. One more household task involvement related to 2.86% decrease in wage. Moreover, occupation difference also caused wage difference. To be specific, “Junior Professional and Officer”, “Skilled workers”, “Normal Workers”, “Farmer Fishman Hunter” were paid significantly less than “Senior Professional and Manager”. Comparing to “Senior Professor and Manager”, “Junior Professor and Officer” earned 10.95% less, “Skilled workers” earned 17.55% less, “Normal Workers” earned 34.10% less, “Farmer Fishman and Hunter” earned 79.38% less.

Comparing to the results indicated in model 1, the gender wage gap reduced by approximately 6% by controlling all the wage factors (education, occupations, household involvements, regions) in model 2. However, females were still paid significantly 18.78% less than males after considering individuals’ age, marital status, working hours, education, occupations, household work involvements and regions, which indicated that the gender discrimination existed in the Chinese labor market.

Based on model 2, model 3 added the interaction term “gender and region” in order to compare the size of gender wage gaps between rural China and urban China. As aforementioned in the method section (the coefficient of gender variable determine the size of gender wage gap in urban China. The coefficient of gender variable and the coefficient of interaction term determine the size of the gender wage gap in rural China), females’ wages were 12.19% less than males’ wages in urban areas. However, the gender



wage gap in rural areas was much larger than this gap in urban areas as female's wages were 24.9%  $[(e^{\beta_1+\beta_{13}}-1)*100 = 0.878 * 0.855 * 100 = 24.9\%]$  less than that of males in rural areas. In other words, the gender wage gap in rural areas was 12.7%  $[e^{\beta_1} * (e^{\beta_{13}}-1)*100 = 0.878 * 0.14 * 100 = 12.7\%]$  larger at significance level than that in urban areas by controlling all the other explanatory variables. This indicated that gender discrimination in rural areas was more serious than that in urban areas.

Table 4. The Results of the Stepwise Regression Models

Variable Names	Model 1		Model 2		Model 3		
	$\beta$	$(e^{\beta} - 1)*100$	$\beta$	$(e^{\beta} - 1)*100$	$\beta$	$e^{\beta} * 100$	$(e^{\beta} - 1)*100$
Gender(female)	-0.279***	-24.35	-0.208***	-18.78	-0.130**	87.81	-12.19
Working hour	0.143***	15.37	0.040***	4.08	0.040***	-	4.08
Age	-0.013***	-1.29	-0.002	-0.20	-0.002	-	-0.20
Marital Status (Married)	0.117**	12.41	0.208***	23.12	0.211***	-	23.49
Education	-	-	0.065***	6.72	0.065***	-	6.72
Junior Professional and Officer	-	-	-0.118*	-11.13	-0.116*	-	-10.95
Skilled Workers	-	-	-0.2***	-18.13	-0.193***	-	-17.55
Normal Workers	-	-	-0.42***	-34.30	-0.417***	-	-34.10
Farmer, Fisherman, Hunter	-	-	-1.579***	-79.38	-1.579***	-	-79.38
Others	-	-	-0.321***	-27.46	-0.321***	-	-27.46
Domestic Duty Involvements	-	-	-0.031***	-3.05	-0.029**	-	-2.86
Region(Rural)	-	-	-0.16***	-14.79	-0.096**	-	-9.15
Female*Rural	-	-	-	-	-0.156**	85.56	-14.44
Cons	9.259***	-	9.288***	-	9.251***	-	-
R2	0.090		0.380		0.380		
F	96.21***		200.85***		186.35***		

Note: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

#### iv. Prediction

Based on the results of Model 3, Table 5 presented the predicted annual wage by gender, urban/rural division, and occupations under the conditions: the population are all married; age, working hours, education, domestic duties involvement took the corresponding sample mean value (age =41 years old, working hour =8 hours, Education = 11 years, Domestic Duties Involvement =2.2). The predicted result represented that

women were paid less than men in both rural and urban China, and women received less wage than men among all the occupation categories. The size of the gender wage gap in rural China is 12.7% more than that in urban China. All this predicted information was consistent with the aforementioned result.

Table 5. The Predicted Annual Wage by Gender, Urban/Rural Division, and Occupations

	Predicted Average Annual wage	Predicted Annual Wage by Occupations					
		Senior Professional and Manager	Junior Professional and Officer	Skilled Workers	Normal Workers	Farmer, Fisherman, Hunter	Others
<b>In Urban</b>							
Average	¥21,088.1	¥29,387.1	¥26,168.5	¥24,229.1	¥19,366.7	¥6,059.1	¥21,318.1
Ratio				87.8%			
Gap				-12.2%			
Male	¥22,456.9	¥31,294.6	¥27,867.0	¥25,801.8	¥20,623.8	¥6,452.4	¥22,701.8
Female	¥19,719.3	¥27,479.6	¥24,469.9	¥22,656.5	¥18,109.6	¥5,665.8	¥19,934.4
<b>In Rural</b>							
Average	¥17,864.0	¥24,894.2	¥22,167.7	¥20,524.8	¥16,405.8	¥5,132.7	¥18,058.8
Ratio				75.1%			
Gap				-24.9%			
Male	¥20,401.3	¥28,430.0	¥25,316.2	¥23,440.0	¥18,736.0	¥5,861.7	¥20,623.8
Female	¥15,326.7	¥21,358.4	¥19,019.1	¥17,609.6	¥14,075.6	¥4,403.7	¥15,493.9

*Note: The value was predicted under the condition that the population are all married; Age, Working hours, Education, Domestic Duties Involvement took the corresponding sample mean value (age =41 years old, working hour =8 hours, Education = 11 years, Domestic Duties Involvement =2.2).*

## X. DISCUSSION

This study examined the status and determinants of the gender wage gap in both rural and urban China. According to the 2011 China Health and Nutrition Survey Data, the results supported that the gender wage gap existed in China: women received 84% of men's earning. The gender wage gap was larger in rural areas than that of urban areas.

The regression model indicated that education, occupation, and time usage were significant factors of individuals' wage. Specifically, education and working hours positively affected wage, while housework involvement negatively influenced wage. The stepwise regression suggested that the presence of gender discrimination in China and this discrimination was more serious in rural labor market than in urban labor market.

The Chinese traditional Feudal thought that "males are superior to female, females are inferior to males" limits female's right to education and occupation choices. It also encourages females devoting themselves to their husbands and families. Although the country advocated gender equality after the establishment of the new China in 1949, gender discrimination was reduced but still existed. Modernization and industrialization might have alleviated traditional feudal thought and relieved gender discrimination after the Reform and Opening Policy and accession to the WTO, but it also enlarged rural urban difference (Xu, Shi and Huang 2014). The cultural and economic development in rural China did not follow up with urban China, the sense of gender equality did not keep pace as well (Feng and Xiao, 2014).

In modern times, women and men tend to have equal education in rural China, and women tend to have higher education than men in urban China. But individuals in urban areas received significantly 2 more years of education than in rural areas, which suggests that the residents in rural areas have a greater disadvantage than that of urban areas regarding education. More importantly, women still received less pay than men, although women tended to have higher education than men in China. It seems like advocating equal education is not enough to reduce the gender wage gap in China.

Furthermore, Occupation difference distribution by gender and region was another factor of rural-urban gender wage difference. The regression indicated that “Junior Professor and Officer”, “Skilled worker”, “Normal Worker”, “Farmer Fishman and Hunter” paid significantly less than “Senior Professor and Manager”, and the “Farmer Fishman and Hunter” earned much less among all the occupation groups. Interestingly, although females had greater proportions of people worked as high pay occupations than that of males (“Senior Professional and Manager” and “Junior Professional and Officer”), females still received significantly RMB 4,965 lower wages than males in China. Associating with the result that females received lower wage crossing all the occupations in China, the results suggested that females still could not receive equal pay with males under the same occupation.

Moreover, females significantly involved more household responsibilities than males in both rural and urban China. Females’ household tasks involvement negatively related to their wage and it is statistically significant. However, this pattern of was not significant for males. Additionally, women in rural areas were significantly involved more than the women in urban areas, and men in rural areas significantly involved less than men in urban areas. That results indicated that females in rural areas faced more disadvantages than females in urban areas on wage regarding household work. The reason might be the lack of affordable and appropriate childcare centers and housekeeping service in rural China (Cook and Dong, 2011). Additionally, rural China’s tenuous sense of gender role equality sense could be another cause, which might reflect the gender discrimination (Feng and Xiao, 2014).

Previous studies suggested that discrimination explained most aspects of the gender wage gap in China (Meng and Miller 1995, Rozelle et al. 2002, Shen and Deng 2008, Zhang et al. 2008, Ng 2007, Shi and Liu 2011, Xiu and Gunderson 2013a, Yao and Long 2013). In the full regression model in this paper, the coefficient of the “Gender” dummy variable was negative (not equals to 0) and statistically significant after controlling all other explanatories, which meant females’ wage were significantly less than males’ wage by considering individuals’ Human capital, occupations, working hours, household responsibilities, regions and other demographic information. This result also indicates that gender discrimination exists in the Chinese labor market. In addition, the gender wage gap was statistically significant larger in rural areas than in urban areas after controlling all other independent variables, which suggests that gender discrimination was stronger in rural labor market than in urban labor market.

In Conclusion, the gender wage gap was smaller in urban China than rural China. Comparing women’s wage factors in both rural and urban China, women had higher education levels than men in urban areas women tended to educate equally with men in rural areas. Additionally, a greater proportion of women in urban areas worked in relatively high occupations and a smaller proportion of women worked in comparatively low occupations than that of women in rural areas. Moreover, women in urban areas were involved less household works than women in rural areas. Therefore, the gender wage gap might be reduced if women can get more years of education, work in higher paid occupations, and involve themselves to less with household works. However, it will still be hard for women to get paid equally as man. As it can be recognized from the urban sample, the gender gap still existed even though women had slightly higher education

level and larger proportion in higher paid occupations. As a result, gender discrimination in the labor market might be the main factor of gender wage difference in both rural and urban China.

## XI. LIMITATION

As mentioned by Olson (2013) and Lips (2012), one of the limitations of using Human Capital theory to explain the gender wage gap is the issue of omitted or left out variables. Although this paper introduced other indicators employed by previous studies in this area, there were still some factors that could not be included in the full model due to the limitations of secondary data, such as, individuals' working experience and health status as the measurements of Human capital. Moreover, there might be other indicators that have not been considered in this area. Similar to the previous studies, all of those explanatory powers from omitted or left out variables were counted into the gender discrimination factor.

This paper suggests that household work involvement negatively affected individuals' wages for both males and females, but the correlation analysis showed that only females' wage were negatively related to household work involvement. Because of the data limitations, the time spent on family was measured by the five items of household work involvement. In real life, individuals may perform other domestic duties than five aforementioned items. Also, the involvement variable presented how many kinds of household duties an individual had taken, which was different than the exact time spent. A woman might perform more kinds of household responsibilities than a man, but she might spend less time than the man. Future research could include both domestic responsibilities and time spent on household tasks to measure the responsibility of

household duties. Future study could also look at whether the time spent on household tasks conflict with the time spent on work, and how work-family conflict related to wages by examining the relationship between the household responsibilities (both numbers of tasks involvement and time spending) and the investment on wage determinants (such as Human Capital and Occupation attainment).

Additionally, Future research on gender discrimination in the labor market could consider more aspects of discrimination. Gender discrimination in the labor market is not only includes the gender discrimination referring to wages, but also includes gender discrimination from other aspects, such as, labor force participation, flexible working schedules, safe working environment, and promotion (Hersch, 2007).

## NOTES:

## 1. Sources from:

(1) U.S. Census Bureau. 2010 Census Urban and Rural Classification and Urban Area Criteria. <https://www.census.gov/geo/reference/ua/urban-rural-2010.html>.

(2) U.S. Census Bureau, 2015 American Community Survey 1-Year Estimates. <https://www.census.gov/en.html>.

(3) China National Census Bureau, 2015 Statistical Yearbook. <http://www.stats.gov.cn/tjsj/ndsj/2015/indexch.htm>.

2. Source: CNBC news, 2014: <http://www.cnbc.com/2014/07/30/gender-wage-gap-in-asia-set-to-get-worse.html>.

3. Detailed information about the Economic Reform police in 1979:

<http://countrystudiea.us/china/92.htm>.

4. “In the context of globalizing economies, ‘labor market restructuring’ represents a countervailing force against the potential benefits of globalization and could reconstitute gender inequality in local economies that have transitioned away from industrial configurations of inequality” (Cauchat et al. 2012:725)

5. All the coefficients and intercepts are stay the same according to the corresponding result of each model in multiple regression. Specifically, in equation (1) to (8), the value of coefficients and intercepts are from the result in Model 2. In equation (9) to (12), the value of coefficients and intercepts are from the result in Model 3.



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