THE INFLUENCE OF MINIMUM WAGE ON GENDER EMPLOYMENT GAP IN CHINA

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By

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ABSTRACT

This paper uses panel data from 31 provinces in China for the years 1997 to 2016 and employs three models, including simple pooled OLS, random-effects and fixed-effects to examine the relationship between the minimum wage standard and the gender employment gap in China. The results of my analyses are consistent across different models and show a high level of robustness. My study demonstrates that the increasing minimum wage standard has a statistically significant negative correlation with the proportion of female employment to total employment, even after controlling for related economic factors, demographic factors and regional factors. Also, it is surprising to find that, while urbanization level has positive effects on female employment, overall economic growth and increasing of educational expenditures do not lower or eliminate the gender employment gap, but instead further increases gender employment differences.

INDEX WORDS: minimum wage, gender gap, employment, China
ACKNOWLEDGEMENTS

The research and writing of this thesis is dedicated to everyone who helped along the way.

Many thanks,
Yushu Chen
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1. INTRODUCTION

Based on the minimum wage history and theory, my study analyzes the influences of minimum age on the gender employment gap in China by using 1997 to 2016 panel data from 31 different provinces. My hypothesis is that an increase in the minimum wage standard enlarges the gender employment gap in China due to higher female sensitivity to wage changes. The data related to employment and minimum wage in this paper are from the China Labor Statistics Yearbook, the China Population and Employment Statistics Yearbook, the website of the Ministry of Human Resources and Social Security of the People’s Republic of China and the website of the people’s government of each province, merged with a separate database of macroeconomic variables at the state level from the website of the National Bureau of Statistics of China.

Minimum wage is a compulsory social system that requires employers to pay workers minimum remuneration under the condition of normal labor supply. The typical justification of formulating the minimum wage is to regulate the relationship between employers and employees and ensure the accessibility of basic needs for low-income groups and their families. However, minimum wage policy has been highly debated since its implementation. On the one hand, many studies show that a binding minimum wage has a negative impact on the employment rate, that it reduces employment levels and forces people out of the labor market. On the other hand, advocates argue that employment losses caused by a minimum wage are relatively small and the redistribution of resources can increase social welfare through the reduction of poverty and the promotion of social stability.
Another realm of debate about minimum wage concerns aspects of racial and gender discrimination. There are historical sexist and racist motivations behind the minimum wage (Blackburn, 1991). It was first designed to keep minorities and women out of job markets by increasing their labor prices. Also, theories exist that the minimum wage should help to decrease the male-female income gap if properly enforced; however, this wage increase for women in the labor market is at the expense of unemployment for low-income female workers (Menon & Rodgers, 2017). In other words, the unemployment effect of the minimum wage may be larger for females than for males which will result in a gender employment gap.

The minimum wage policy is relatively young in China compared to policies in western countries that have already been implemented for more than 100 years. In China, in 1994, the Standing Committee of the Eighth National People's Congress deliberated and passed the “Labor Law of the People's Republic of China”. In the same year, the Ministry of Labor issued the “Notice on Implementing the Minimum Wage Security System”, and the minimum wage system was fully implemented. In 2004, the Ministry of Human Resources and Social Security of the People’s Republic of China announced the latest version of “Provisions on Minimum Wage”. The provisions expand the scope of the minimum wage and stipulate that the minimum wage standard should be adjusted at least once every two years. Nowadays, China is known for its extensive minimum wage system across sectors and provinces.

Due to uneven development across provinces, how well the minimum wage is enforced varies significantly. In rural areas, most people engage in self-employment and are in the unregulated informal sector. It is hard to track whether workers receive a
minimum wage when there are no formal organizations and units. As a result, a minimum wage primarily affects employees in urban area and in formal sectors. This study will focus on the urban area in each province.

In Sections II and III, I discuss background information on the topic, including the history of minimum wage, the development of China’s minimum wage policy, as well as review the literature and summarize the relevant theory. In Section IV, I develop a theoretical framework to explain the application of the minimum wage. In Section V and Section VI, I provide a description of the data collected and the econometric model. For the empirical analysis, I use a model that relates the proportion of the female employed population of the total employed population to the minimum wage, economic factors, demographic factors, and region dummies. Holding other factors fixed, if the minimum wage has a significant negative influence on the proportion of female employment, then I can conclude that the policy enlarges the gender employment gap and crowds out women from the market. In the last Section, based on the empirical results from Section VII, I summarize and conclude with policy recommendations.
2. BRIEF HISTORY AND BACKGROUND

In this section, I provide a brief history of minimum wage and a background of minimum wage implementation in China.

2.1 The Brief History of Minimum Wages

The first minimum wage law was enacted by New Zealand in what is known as the Industrial Coalition and Arbitration Act of 1894. This act was a compulsory arbitration act that aimed to settle disputes and prevent strikes by establishing councils of conciliation. One of the major conflicts within New Zealand’s labor market at that time is that many teenagers and apprentices were employed without any wages under the name of training. The purpose of the provision of a minimum wage was to prevent the employment of teenagers and low-skilled workers at zero or low cost and open the space for other groups of people (Verrill, 1915).

The aim of the minimum wage law in Great Britain, the Trade Boards Act, introduced in 1909, was very similar to New Zealand’s. Due to the over-supply of workers, especially in underpaid and sweat-shop industries such as chain-making and paper-box making, the government decided to set a minimum wage to crowd women, minorities and low-skill workers out of the labor market. Among the industries to which the act was applied, 70 percent of the workers were female (Blackburn, 1991).

As we can see from the perspective of history, there were sexist and racist motivations behind the origins of the minimum wage, and it is possible that the minimum wage may have negative influences on the employment of female, teenager and low-skill workers.
2.2 The History of Minimum Wages in China

After China officially acknowledged the International Labor Organization’s Minimum Wage-Fixing Machinery Convention in 1984, Zhuhai in Guangdong province became the first city in China to implement its local minimum wage regulations in 1989 and was followed by several other cities, such as Shenzhen, Jiangmen and Guangzhou (Fang & Lin, 2015).

However, there was no official national minimum wage policy in China until the Chinese government issued the Enterprise Minimum Wage Regulation in 1993. One year after, the Standing Committee of the Eighth National People's Congress deliberated and passed the “Labor Law of the People's Republic of China” which included the 1993 minimum wage regulations. During the same year, the Ministry of Labor issued the “Notice on Implementing the Minimum Wage Security System” which represented the starting point of implementation of the Chinese minimum wage system.

According to the 1994 legislation, employers are not allowed to pay wages less than the local minimum wage standard. Also, the minimum wage should be set up and adjusted by the regional government and based on local conditions, which include local average wages, local employment status, labor productivity, levels of economic development and minimum living expenses (Frost 2002; Wang and Gunderson 2011). Although the minimum wage should be reported to the State Council, the province, autonomous regions and the municipalities governments have a great extent of flexibility in setting their own minimum wages. By the end of 1994, seven provinces out of the total of 31 provinces (excluding Hong Kong, Macau and Taiwan) had set local minimum
wages. By the end of 1995, 17 more provinces and municipalities reported their minimum wage to the central government.

The critical year for Chinese minimum wage policy was 2004. The huge number of uncovered workers under the 1994 regulation and labor shortages in some provinces raised the awareness of the importance of modifying the policy. As a result, in March 2004, the Ministry of Human Resources and Social Security of the People’s Republic of China promulgated the latest version of “Provisions on Minimum Wage”. There were five main changes in minimum wage regulations according to this provision. First, it expanded the scope of the minimum wage from enterprise to state-owned units, collective-owned units, private enterprise, private non-enterprise entities and employers in self-employed industries. Second, the provision stipulated that the local minimum wage standard should be adjusted at least once every two years. Third, the standards for minimum wages were divided into two forms: the monthly minimum wage and the hourly minimum wage. The former standard applies to full-time normal employers, while the latter applies to non-fulltime non-regular ones. Fourth, the minimum wage should be determined by the local people’s government, labor union and the league of enterprise at the same level. However, in reality, the local governments have the primary power in determining the local minimum wages (Li & Ma, 2015). Fifth, the provisions paid more attention to enforcement. The penalties for violating the regulations were raised from 20 percent to 100 percent of the owed wage to 100 percent to 500 percent. By the end of 2005, all of the 31 provinces had set their own minimum wages, which indicates the full implementation of China’s minimum wage policy.

In 2008, minimum wage regulations were written into the “Labor Contract Law”
which took effect in May. It further defined the role of the minimum wage system in China (Ma, Li & Cai, 2017). From 2009 to 2016, after the new regulations were enforced, the monthly minimum wage for each province, autonomous regions and the municipalities substantially increased. However, there are great regional disparities. For example, the minimum wage level in the eastern area is higher than in the western and central areas (see Figure 1). Also, the growth of the minimum wage standard is much slower than the growth of the employers' average wage in formal sector. Using Beijing as an example, from 1997 to 2016, the minimum wage grew from 290 yuan (roughly 43 dollars) to 1890 yuan (roughly 282 dollars), while the average wage changed from 918.25 yuan (roughly 137 dollars) to 9994 yuan (roughly 1490 dollars). The growth rate of minimum wage standard in Beijing is 551.7 percent, which is much smaller than the growth rate of average wage of 988.4 percent (see Figure 2).

Figure 1: Regional Disparities of Minimum Wage Levels
Additionally, there are between 1 and 7 levels of minimum wage within each province, which depends on the level of development. Using Hebei province as an example, starting in 2009, it has been divided into 4 categories according to economic development level, and the four different minimum wage standards correspond to these categories. Eight districts and cities such as Shijiazhuang were classified as first category and implemented the highest level of minimum monthly wage standard which was 1,650 yuan in 2016 (roughly 250 dollars). Forty-six districts and counties such as Chengde were classified into the fourth category and implemented the fourth level of minimum monthly wage standard, which was 1,380 yuan in 2016 (roughly 205 dollars). From 2009 to 2016, the minimum wage standard in Hebei province has been adjusted five times. Each level of minimum wage was increased by different degrees, but the area applicable to each standard did not change.

Although the Chinese government is increasing the penalties for violations, China as
a developing country still faces difficulties in enforcing compliance with these regulations, especially in the informal and private sectors (Rawski, 2006). It is hard to track whether workers receive a minimum wage when there are no formal organizations and units when people engage in self-employment and work in the unregulated informal sector. As a result, the phenomena of migrant workers and informal sector workers earning wages less than a minimum wage standard is widespread and it is not fully reflected in the data that are published by the National Bureau of Statistics of China, which are mostly based on urban surveys (Jia, 2014).

In the next section, I discuss the literature and evidence both from China and other countries regarding employment effects and the gender sensitivity of minimum wages.
3. LITERATURE REVIEW

3.1 The Debate on Adverse Employment Effect of Minimum Wage Policy

The effect of minimum wage policy has been long discussed and debated since its implementation. A wide range of methods have been used by scholars to investigate this topic, including time-series analysis, difference-in-differences methodology, panel data analysis, regression discontinuity design and so on. However, there is no consensus among scholars on whether minimum wages have negative impacts on employment.

Some studies show that a minimum wage has a statistically significant negative impact on employment, especially among youth because of their lower skill level and thus higher sensitivity to the price of labor.

By using time-series and cross-sectional data, Brown (1982) concluded that for every 10 percent increase in the minimum wage, youth employment will decrease by 1 to 3 percent. After simulating the effect of a minimum wage, Meyer and Wise (1983) yielded the result that, without a minimum wage, the employment rate for males between 16 and 24 years old would be 6.8 percent higher, and the number for those aged 20 to 24 and 16 to 17 would be 3.6 percent and 9.5 percent higher, respectively. Some later time-series studies came to the same conclusions. For example, Bazan (2002) found that, for every 10 percent increase in the minimum wage, youth employment will decrease 1.1 percent in the short term and decrease 2.66 percent in the long term, which is consistent with Brown’s previous results.

Instead of focusing on total teenage employment, Coomer and Wessels (2013) investigated the effect of minimum wage on covered employment (the employment of teenagers who are receiving wages equal to or higher than minimum wage standards) by
using a logit model. They found that minimum wages had a statistically significant negative effect on covered employment. Also, the magnitude of the negative effect is higher for covered employment than for total teenager employment.

There are also some Canadian studies that showed that the minimum wage has adverse employment effects. Due to the large variation in minimum wages in Canada, Canadian data have excellent advantages for the evaluation of minimum wage effects (Hamermesh, 2002). Rybczynski and Sen (2018) analyzed a panel dataset from 1981 to 2011 across Canadian provinces and found an association between a 10 percent increase in the minimum wage and 1 percent to 4 percent reductions in both male and female employment rates respectively. Moreover, a recent study based on the “difference in difference” methodology suggested that a minimum wage has substantially larger adverse employment effects for permanent as opposed to temporary minimum wage employment (Campolieti, Gunderson & Lee, 2014).

On the other hand, some scholars hold the point of view that a minimum wage does not have negative influences on employment and sometimes even has positive effects.

In Card’s and Krueger’s case study (1994), they compared the employment rate of the fast-food industry in New Jersey and Pennsylvania and found no relationship between rising minimum wage and lower employment. Crossman (2001) studied the influence of national minimum wage in Britain on the hotel sector. The evidence shows that, while the national minimum wage suggests some wage gains, it has no significant association with decreases in employment.

Some more recent studies also came to the conclusions that there is no adverse employment effect. Slonimcz and Skott (2012) conducted a regression under the
assumption that there were two types of workers (high-skill and low-skill) and two types of jobs (high-tech and low-tech) in an economy. The result indicates that an increase in the minimum wage can raise not only total employment but also low-skill workers’ employment. Another study analyzed the effect of the minimum wage on employment from a two-sided perspective. It suggests that a sufficiently low minimum wage doesn’t decrease employment, because the decrease in job-offer incentives are offset by the increase in job-acceptance incentives (Brown, Merkel and Snower, 2014).

Apart from studies in western countries, there is evidence from South Korea. Baek and Park (2016) revealed that the national minimum wage introduction increases the average wages for employees in the labor market but has no significant effect on plant-level employment.

In summary, there is no consensus among existing studies in terms of the direction and magnitude of the minimum wage effect on employment. However, most of the studies show that certain groups of people, such as youth, are more vulnerable than others.

3.2 The Debate on Gender Sensitivity of Minimum Wage Policy

Most of the existing studies investigate the relationship between minimum wage and employment from the perspectives of a worker’s age, skill level and sector, while only a few of them focus on gender.

There is evidence from China that suggests female workers are in a disadvantaged situation in the current labor market. They are thus potentially more vulnerable to increases in the minimum wage than male workers.
Peng Jia (2014) has provided related empirical evidence from his difference-in-differences model research. He looked at individuals who got less than a junior high school education from the China General Social Survey and estimated a model with control groups and treatment groups to estimate the minimum wage effects on employment and working hours by gender. His estimation shows that, for males, a minimum wage increase has no adverse employment effect, but has a significant positive influence on male working hours. However, for females, the opposite is true. Women’s employment is negatively affected while female working hours show no statistically significant change. According to his finding, Jia concluded that increasing working hours for males may push women into a more disadvantaged position. Instead of hiring females, companies may prefer to have male employees and extend their working hours.

Another study also suggests that female employment in China will be negatively affected by the minimum wage. In Fang and Lin’s paper (2015), county-level panel data are used to estimate the employment effect of minimum wage changes. They found that, if the minimum wage increases by 10 percent, the employment for young female workers will decrease by 1.48 percent, which is statistically significant.

Some studies based on foreign countries came to the same conclusion. Using a panel dataset of women who are in their 20’s and 30’s in Japan, Kawaguchi and Yamada (2006) examined the impact of a minimum wage on female employment. By comparing the rate of transiting from employment to unemployment in a one-year window, they concluded that the female workers who’s last year’s wage is less than the revised minimum wage are about 20 percentage points less likely to stay in the labor market in the current year than comparable low-wage female workers who are not affected by the revision.
For evidence from OECD countries, a study exploited a cross-country panel from 16 OECD countries from 1970 to 2008 to investigate the sensitivity of female employment to wage changes. The author found that an increase in the minimum wage is associated with a decrease in female participation rates. Moreover, the results between well-regulated labor markets and the least regulated one have no significant differences (Addison & Ozturk, 2012).

Although the majority of studies indicate that female employment is more sensitive to minimum wage changes, whether minimum wage is a gender sensitive policy intervention is still highly debated. There is no agreement in academia.

For example, according to a study based in India, the impact of minimum wage regulations on employment depends on region rather than gender. In India’s rural areas, the minimum wage has statistically significant positive impacts on both female and male employment. In contrast, regardless of gender, a minimum wage has little to zero influence on urban employment. Although there is no evidence for a gender employment gap under the minimum wage, the gender wage gap is widening. One of the reasons is that, in developing countries, noncompliance with minimum wage regulations is widespread. The group that suffers from such weak compliance is females (Menon & Rodgers, 2017).

This paper will contribute to the literature by conducting a quantitative study of the relationship between minimum wage and the gender employment gap in China, using a panel dataset from all provinces across a long-time span. As the literature I discussed shows, most of the adverse employment effect studies were conducted from the perspective of age and skill level instead of gender. Also, the majority of studies
investigated the gender wage gap instead of gender employment gap in terms of gender sensitivity to minimum wage policy. By estimating a model which aims to evaluate whether an increasing minimum wage can lead to a decreasing proportion of female employment to total employment, I will be able to comment not only on evidence of adverse female employment effects, but also on some evidence from China on the relationship between employment and minimum wage which is highly limited in the current body of literature.
4. THEORETICAL FRAMEWORK

In order to examine the influence of minimum wage on the gender employment gap in China, I have developed the following theoretical model. This framework discusses the factors that should influence the employment gap between males and females including the minimum wage, economic factors and demographic factors. My empirical model is developed following the idea of this framework and it also tests the implications of this theoretical model.

The theoretical framework is as follows:

\[ \text{Gender Employment Gap} = f (\text{Minimum Wage, Economic Factors, Demographic Factors, } \mu) \]

(1)

It is important to notice that, instead of using the absolute quantity of female employment, the dependent variable in this analysis is relative quantity of female employment to total employment, which will better capture whether there exists a crowding out effect for female employers in the labor market.

The logic behind this model is that the gender employment gap in China is associated with the minimum wage, overall economic and labor market conditions such as GDP and unemployment rate, as well as demographic factors such as the working age population. The minimum wage will influence employers hiring both female and male employees; however, the degree of sensitivity is expected to be different among the two groups of people. After controlling for the economic factors and demographic factors, I can estimate the relative change in female employment and show the relationship
between the gender employment gap and a minimum wage.
5. DATA AND DESCRIPTIVE STATISTICS

5.1 Data Sources

My research uses a 1997 to 2016 panel of 34 different provinces in China. The data come from five main sources: the China Statistical Yearbook, the China Labor Statistics Yearbook, the China Population and Employment Statistics Yearbook, the website of the National Bureau of Statistics of China and the website of Ministry of the Human Resources and Social Security of the People’s Republic of China. To create the panel dataset, I consolidated the provinces level dataset that I need for my empirical study from the above resources. The resulting panel consists of 551 complete observations and 69 incomplete observations (for a total of 620 observations, or 20 years’ data for 31 provinces), which is sufficient for my econometric analysis. (See Table 1 for descriptive statistics.)

The details of my data collection process are as follows.

First, the data for macroeconomic variables, such as gross domestic product (GDP), consumer price index (CPI) and unemployment rate, as well as the data for educational expenditure, come from the website of the National Bureau of Statistics of China. The website provides a wide-range of economic data at both province level and national level for every individual year.

Second, except for the year 2001, the data for population and its composition, which are used to calculate the workforce variable, come from the China Statistical Yearbook (CSYB). The CSYB is an annual statistical publication, which comprehensively reflects the economic and social development of China. The population section in the CSYB covers the data that show the basic condition of each year’s national, urban and rural
population. However, for the year 2001, the population composition data are missing in CSYB. As a result, I used the data from the China Population and Employment Statistics Yearbook (CPESYB) to fill in this blank.

Third, data concerning female employment in urban units and total employment in urban units are derived from the China Labor Statistics Yearbook (CLSYB). The CLSYB is also an annually released statistical publication. It reveals the economic labor conditions at different levels, including national level and province, autonomous regions and the municipalities levels. Data resources for this yearbook are mainly from the state and departments reporting system, administration records and sampling surveys.

Fourth, minimum wages from 2009 to 2017 come from the website of the Ministry of Human Resources and Social Security of the People’s Republic of China. Each province or autonomous region or municipality can possibly have various levels of minimum wage due to unbalanced development within a region. After 2009, the data for all 31 provinces are well collected and assembled by the Ministry of Human Resources and Social Security. However, there are no well-collected data for years before 2009. To gather these data, I had to go to the website of the people’s government of each province and go through the government annual work report for each year to find the change in minimum wage relative to the previous year.

Finally, the data for urbanization level - the percentage of urban population to total population – come from the China Population and Employment Statistics Yearbook (CPESYB). One thing I should mention is that the CPESYB’s calculation process for urbanization level has changed in year 2015. Before 2015, urbanization is calculated based on the proportion of non-agricultural population. After 2015, it is calculated based
on the proportion of urban population, which consists of a slightly larger proportion of total population than the previous standard.

In general, I believe that I have collected these data from the most comprehensive and accurate resources available. Although they still have some limitations, which I will discuss next, the dataset is sufficient to estimate the empirical model in this paper.

5.2 Data Limitations

One of the main limitations is that there exist some missing data. First, because there is no female employment section in the CLSYB1999, I could not collect the number of female jobs in urban units at the province level for the year 1998. I was thus not able to calculate the proportion of the female employed population in total employed population, which serves as my dependent variable. Second, the data for educational expenditure in 2012 is missing. Third, Tibet’s data are very incomplete. Almost one third of the unemployment rate data are missing due to the poor local government records. Also, the minimum wage was not implemented until 2004 in Tibet. Observations for Tibet before 2004 thus is not useable in my empirical model. However, I believe that the missing data problem I mentioned above will not cause biased estimations, because the reason for missing data is not related to my research.

Another limitation is that the data do not observe rural areas employment conditions, or informal sectors. Although the data for macroeconomic variables are counted at the level of the whole province, the data related to employment and education level all capture the character of the urban working population. This analysis only counts for urban areas for two reasons. First, the data for rural area employment are not well
collected. Second, the minimum wage is not well enforced in rural areas. In rural areas, most people engage in self-employment and working in the unregulated informal sector. It is hard to track whether workers receive a minimum wage when there are no formal organizations and units. As a result, the effect of the minimum wage is relatively small. However, omitting rural area data means that this study is not able to give a whole picture of the influence of the minimum wage on the gender employment gap in China. It may also bias the coefficient on the minimum wage towards zero, since female employees in rural areas could be more sensitive to changes in the minimum wage.
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6. EMPIRICAL MODEL

6.1 Model Specification

In order to test the theoretical model, I used pooled OLS, a random effects specification and a fixed effects specification. These models relate the gender employment gap with the minimum wage, economic factors, demographic factors and region dummies. My models are as follows:

Simple Pooled OLS:

\[ \text{Ratio} = \beta_0 + \beta_1 \text{lnwage}_1_{it} + \beta_2 \text{lngdp}_1_{it} + \beta_3 \text{urbanization}_1_{it} + \beta_4 \text{unemployment}_1_{it} + \beta_5 \text{cpi}_1_{it} + \beta_6 \text{workforce}_1_{it} + \beta_7 \text{edugdp}_1_{it} + \beta_8 \text{middle}_1_{it} + \beta_9 \text{west}_1_{it} + \beta_{10} \text{municipality}_1_{it} + u_{it} \]

\[(2)\]

Random Effects:

\[ \text{Ratio} = \beta_0 + \beta_1 \text{lnwage}_1_{it} + \beta_2 \text{lngdp}_1_{it} + \beta_3 \text{urbanization}_1_{it} + \beta_4 \text{unemployment}_1_{it} + \beta_5 \text{cpi}_1_{it} + \beta_6 \text{workforce}_1_{it} + \beta_7 \text{edugdp}_1_{it} + \beta_8 \text{middle}_1_{it} + \beta_9 \text{west}_1_{it} + \beta_{10} \text{municipality}_1_{it} + v_{it} \]

\[(3)\]

Fixed Effects:

\[ \text{Ratio} = \beta_0 + \beta_1 \text{lnwage}_1_{it} + \beta_2 \text{lngdp}_1_{it} + \beta_3 \text{urbanization}_1_{it} + \beta_4 \text{unemployment}_1_{it} + \beta_5 \text{cpi}_1_{it} + \beta_6 \text{workforce}_1_{it} + \beta_7 \text{edugdp}_1_{it} + \beta_8 \text{middle}_1_{it} + \beta_9 \text{west}_1_{it} + \beta_{10} \text{municipality}_1_{it} + \alpha_i + u_{it} \]

\[(4)\]
Table 2: Variable Definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ratio</td>
<td>Female employment ratio</td>
</tr>
<tr>
<td>( \ln \text{m wage1} )</td>
<td>Logarithm of minimum wage standard</td>
</tr>
<tr>
<td>( \ln \text{gdp} )</td>
<td>Logarithm of GDP</td>
</tr>
<tr>
<td>\text{urbanization}</td>
<td>The percentage of urban population out of the total population</td>
</tr>
<tr>
<td>\text{unemployment}</td>
<td>Unemployment rate</td>
</tr>
<tr>
<td>\text{cpi}</td>
<td>Consumer price index</td>
</tr>
<tr>
<td>\text{workforce}</td>
<td>The proportion of the total population aged 15 to 64 to total population</td>
</tr>
<tr>
<td>\text{edugdp}</td>
<td>The proportion of educational expenditure to GDP</td>
</tr>
<tr>
<td>\text{middle}</td>
<td>Equals 1 if the observation is in middle region, and equals 0 if otherwise</td>
</tr>
<tr>
<td>\text{west}</td>
<td>Equals 1 if the observation is in western region, and equals 0 if otherwise</td>
</tr>
<tr>
<td>\text{municipality}</td>
<td>Equals 1 if the observation is a municipality, and equals 0 if otherwise</td>
</tr>
</tbody>
</table>

6.2 Variables Definition

**Dependent Variable**

As mentioned in previous sections, the dependent variable is *female employment ratio* which is the percentage of total female employed population to total employment in urban areas. I created this variable by using employment population data from the CLSYB. It is intended as a measurement of gender employment equality and the employment gap between males and females. As the ratio goes closer to 50, it indicates that the female disadvantage in terms of employment is shrinking.

**Independent Variable**

My models use four categories of independent variables – minimum wage, economic factors, demographic factors and region dummies. Each of them will be explained in detail below.

My explanatory variable of interest is the minimum wage standard. The variable
Inwage1 is the logarithm of the highest minimum wage standard within each province. Since there are no county level data available, it is hard to construct proper weights for different levels of minimum wage. One of the reasons why I choose to use the highest standard is that I focus on urban employment: the big cities within each province with the highest minimum wage include most of the urban population.

The second set of independent variables in my model is made up of economic factors. Three of these variables, the logarithm of gross domestic product (lngdp), the unemployment rate (unemployment) and the consumer price index (cpi), come from the website of the National Bureau of Statistic of China, while the percentage of urban population to total population (urbanization), which measures the level of urbanization level, comes from the China Population and Employment Statistics Yearbook. All of them are intended as measurements of economic and labor market development levels.

The third category of control variables consist of demographic variables. These controls are educational expenditure (edugdp) and workforce population (workforce). The former measures the proportion of educational expenditure to local GDP, which captures the trend of the government’s spending on education. I choose to use educational expenditure instead of educational attainment because it sheds more light on whether the government’s educational investment helps to close the gender gap. The latter is calculated by dividing the population aged 15 to 64 by the total population, which controls for demographic structural changes across the years.

The region dummies make up the final set of explanatory variables. The base category is the provinces that are located in eastern China. I created two dummies accordingly – the provinces that are located in the middle region (middle) and the
provinces in the western region (west). Also, there are four municipalities in China with the most developed economies: Beijing, Shanghai, Tianjin and Chongqing. Including the municipalities dummy (municipality) into my model allows me to identify whether the most developed cities have more equal gender employment structures.

Despite the varying specifications across all three models, I expect the results for each variable to be consistent because all of the models hold the same underlying assumptions.

I anticipate that the explanatory variable of interest, lnmwage1, will have a statistically significant negative impact on gender employment gap given the hypothesis that females are more sensitive to increases in the minimum wage. I also predict the variables lndgp and urbanization will have positive effects on female employment because economic development contributes to gender equality to a large extent. For the variables of unemployment and workforce, I expect them to have significant negative influences on gender employment equality because, as measures of work opportunity, if women are less competitive than men especially when there are fewer available jobs or more working age population in the labor market, then, these coefficients will be negative. Moreover, I anticipate that the other demographic variable, edugdp, will have a statistically significant positive impact on the gender employment gap given the consensus that educational attainment is a key factor that determines an individual’s labor force participation status. I assume that increasing government spending on education will close the educational attainment gap between males and females, and thus close the employment gap between genders. The last set of variables to be discussed are the region dummies, middle, west and municipality. There are large disparities among different
regions in China. I predict that the eastern region will have a smaller gender employment gap than the middle and western regions due to a higher degree of openness and economic development. Also, due to the same reason, I expect the coefficient for municipality will be positive. The four municipalities will have a more balanced gender employment structure than the other provinces.
7. RESULTS

According to the empirical model described in the previous section, I ran two main regressions in this paper, including a simple pooled OLS regression and a fixed effects regression. The results conform to my hypotheses in both models. After controlling for related demographic and economic factors, the results indicate a significant negative relationship between minimum wage and the female employment ratio.

I note here that, while I report OLS, random effects and fixed effect all together below for comparison purposes, the Hausman specification test indicates that the fixed effects model is the appropriate model relative to random effects. The test rejects the null hypothesis that random effects is the proper model at the one percent level of significance. (See the Appendix for this result.) The reason why I include the results of random effects model is to verify the robustness of the coefficients on three dummy variables, middle, west and municipality. These dummies are omitted in the fixed effects model because they are time-invariant independent variables. However, they are not dropped from the random effects model and can be used as a comparison to the OLS model. With this information in mind, the results for these three regressions are summarized in Table 3, below:
Table 3: Summary of Regression Results

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Simple Pooled OLS</th>
<th>(2) Random Effects</th>
<th>(3) Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnmwage1</td>
<td>-1.475***</td>
<td>-1.563***</td>
<td>-0.996*</td>
</tr>
<tr>
<td></td>
<td>(0.277)</td>
<td>(0.380)</td>
<td>(0.550)</td>
</tr>
<tr>
<td>lngdp</td>
<td>-0.00686</td>
<td>-0.226</td>
<td>-0.794*</td>
</tr>
<tr>
<td></td>
<td>(0.134)</td>
<td>(0.285)</td>
<td>(0.472)</td>
</tr>
<tr>
<td>urbanization</td>
<td>0.0796***</td>
<td>0.0386***</td>
<td>0.0366***</td>
</tr>
<tr>
<td></td>
<td>(0.0109)</td>
<td>(0.0105)</td>
<td>(0.0111)</td>
</tr>
<tr>
<td>unemployment</td>
<td>-0.502***</td>
<td>-0.310***</td>
<td>-0.297**</td>
</tr>
<tr>
<td></td>
<td>(0.115)</td>
<td>(0.118)</td>
<td>(0.118)</td>
</tr>
<tr>
<td>cpi</td>
<td>0.0431</td>
<td>0.00773</td>
<td>0.0112</td>
</tr>
<tr>
<td></td>
<td>(0.0448)</td>
<td>(0.0319)</td>
<td>(0.0316)</td>
</tr>
<tr>
<td>workforce</td>
<td>-20.48***</td>
<td>-2.270</td>
<td>2.299</td>
</tr>
<tr>
<td></td>
<td>(3.774)</td>
<td>(3.904)</td>
<td>(4.334)</td>
</tr>
<tr>
<td>edugdp</td>
<td>-0.123</td>
<td>-0.0269</td>
<td>-0.00105</td>
</tr>
<tr>
<td></td>
<td>(0.0798)</td>
<td>(0.0790)</td>
<td>(0.0822)</td>
</tr>
<tr>
<td>middle</td>
<td>-3.142***</td>
<td>-3.228***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.264)</td>
<td>(0.729)</td>
<td></td>
</tr>
<tr>
<td>west</td>
<td>-2.174***</td>
<td>-2.632***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.283)</td>
<td>(0.652)</td>
<td></td>
</tr>
<tr>
<td>municipality</td>
<td>-1.993***</td>
<td>-1.430*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.347)</td>
<td>(0.821)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>57.97***</td>
<td>50.88***</td>
<td>45.30***</td>
</tr>
<tr>
<td></td>
<td>(4.257)</td>
<td>(3.491)</td>
<td>(3.957)</td>
</tr>
</tbody>
</table>

Observations      551  551  551
R-squared         0.415  0.321
F-test            52.44*** 34.61***
Number of provincesid 31  31

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Overall the results show a high level of robustness. All of the above models yield similar and consistent results, not only for the minimum wage, which is the variable of interest, but also for most of the other right-hand-side variables. The R square is 0.415 for the OLS model and 0.321 for the fixed effects model. Both of them are at an acceptable level and show that the model can explain a reasonable amount of variation in female
employment ratio.

To determine whether my set of models is well specified, my first step is testing for model specification errors in the simple pooled OLS model. First, I ran a linktest and an ovtest to see if there are omitted variables. Both tests are statistically insignificant and show no evidence of missing variables that are critical to the model. (See the Appendix for the results.) Second, I ran a VIF test to detect for multicollinearity. The test shows that the mean VIF is 2.16, which is fairly near one and far below the rule of thumb standard of 10. (See the Appendix for this result.) It demonstrates that there is no notable multicollinearity between the independent variables that may undermine the validity of the model’s estimation results. In a word, these outcomes demonstrate that my OLS regression is generally well specified. It provides solid background for the specification of the fixed effects model, and more importantly, the results that the OLS model yields can be of valuable reference alongside with the fixed effects model’s results.

Because the fixed effects model controls for the unobserved individual effects of each province that may be correlated with the independent variables, it is generally a better model than simple pooled OLS. Also, because the minimum wage standard is required to be changed at least once every two years, it guarantees enough variation between 1997 to 2016, which makes the results of the fixed effect reliable. Although my tests indicate that the OLS model has no significant specification error, the fixed effects model will still be valuable in terms of understanding the relationship between minimum wage and the gender employment gap. As a result, I will pay attention to both models and examine the results in more detail in the following paragraphs.

As expected, the estimated coefficient for the minimum wage variable is negative
and highly significant (p<0.01) in the simple pooled OLS regression. The significance of the coefficient, however, drops in the fixed effects model (p<0.1), which I suspect that is because the main variable varies less year to year than the other ones in the fixed effects regression. The simple pooled OLS model indicates that, holding other factors fixed, a 10 percent increase in minimum wage standard is associated with a 0.15 percentage point decrease in the female employment ratio. Generally, an OLS model will bias the coefficients due to the failure to control for the unobservable individual characteristics of each province on the dependent variable. As a result, the magnitude of this variable of interest decreases from -1.475 to -0.996 in the fixed effects regression. Although the magnitude and the significance of the coefficient are slightly different between two models, the results still can be seen as consistent. Both models agree that an increase in the minimum wage standard has a statistically significant negative influence on female employment. This is consistent with my hypothesis that women are more sensitive and vulnerable to changes in minimum wages.

Another influential explanatory variable is urbanization level. The estimated coefficients for the urbanization level are positive and highly significant at the one percent level of confidence in both OLS and fixed effects regressions. The fixed effects model estimation demonstrates that a 10 percentage points increase in the urbanization level - the proportion of urban population to total population – will result in a 0.36 percentage point increase in female employment ratio, while the OLS estimation indicates a 0.42 percentage point larger influence than the fixed effects results. Employment gender structure appears more balanced between males and females in urban areas. Urban females may be less constrained by traditional culture that says that
women should stay at home and take care of their families, for example. Another reason may relate to relatively higher female educational attainment in urban areas.

The estimated coefficients of the economic independent variables reveal interesting and mixed results in terms of statistical significance, signs, and magnitudes of the coefficients. The estimated coefficient of *Gross Domestic Product (GDP)* is insignificant for the OLS model, but is significant (p<0.1), and surprisingly negative, for the fixed effects model. This result shows that there exist unobserved effects that are correlated with GDP and have influence on the female employment ratio. After adjusting for the individual provincial characteristics, the estimation implies that the higher the GDP, the lower the female employment ratio will be. A one percent increase in GDP is associated with 0.008 percentage point decrease in dependent variable. Although the magnitude is at a low level, the result still shows a negative relationship between GDP growth and female employment ratio, which indicates that GDP growth disproportionally benefits male workers. This result runs counter to my hypothesis that overall economic growth will improve gender employment equality. Moreover, none of the estimated coefficients of the *Consumer Price Index (CPI)*, which aims to control for the price level change, are statistically significant, indicating that the CPI doesn’t affect the female employment ratio. In contrast, the estimated coefficients of the unemployment rate are consistently significant, and negative, across different models, but the fixed effects regression result has a smaller magnitude than OLS. The estimated coefficient on unemployment rate in the fixed effects model shows that a one percentage point increase in unemployment rate will lead to a 0.297 percentage point decrease in the female employment ratio. As expected, this finding reflects that, compared to males, females have a harder time
finding jobs when facing a higher unemployment rate. In other words, females are more sensitive to a rise in the unemployment rate.

The demographic independent variable estimations also demonstrate interesting results. The estimated coefficient for the workforce is highly significant (p<0.01) and positive with a large magnitude for the OLS regression; however, in the fixed effects model, the estimation is not statistically significant and changes from -20.48 to 2.299. Because there is enough variation for the workforce variable for the fixed effects model, the large gap between two estimations is likely mainly because OLS model doesn’t control for unobserved effects. As a result, the fixed effects regression indicates that the simple pooled OLS may be biased. The estimations of another explanatory variable, education expenditure, run counter to my hypothesis. Although all the estimations are not statistically significant, they consistently show a negative relationship between educational expenditure and female employment. My analysis of the reasons for the counterintuitive results is as follows. In the model, the data for the education indicator are national data, without considering the actual educational expenditure differences between male and female. Although the total educational expenditure is increasing, educational expenditure on females may not necessarily increase at the same time. Another situation is that the growth rate of female educational expenditure may increase more slowly than the growth rate that for males, which leads to a relative decrease in educational resources for females. Either way, the result indicates that males benefit more from growth of national educational expenditure than females.

Next, I examine the results for the dummy variables in more detail. According to the OLS estimations, the coefficients for middle, west and municipality are all statistically
significant at the one percent level. The random effects model conforms to the results to a certain degree. We can tell from the results that there are huge differences between the middle, western, and eastern regions of China. Holding other effects fixed, the *female employment ratio* in the middle area is 3.14 percentage points lower than in the eastern area, while the *female employment ratio* in the western area is 2.17 percentage points lower than in the eastern area. The economic development level, immigration phenomena and female educational attainment level may be contributions to the differences. The estimated coefficient for *municipality* is against my original hypothesis that the four municipalities (Beijing, Tianjin, Shanghai, and Chongqing) will have higher female employment ratios and better gender employment equality. In contrast, the results from OLS indicate that, on average, female employment rates in these four municipalities is 1.99 percentage point lower than in other cities. It is very hard to explain such phenomena and shows a need for further research.

Overall, the estimated coefficients of my explanatory variable of interest - *minimum wage* – are both statistically and substantively significant, just as expected. *Urbanization level, unemployment rate, middle, west and municipality* are other influential independent variables in terms of estimating the *female employment ratio*.

I now turn to the policy implications of these findings.
8. CONCLUSIONS AND POLICY RECOMMENDATIONS

8.1 Summary of Findings

By using provincial level panel data from 1997 to 2016, in this study I examine the impact of the minimum wage standard on the gender employment gap in China, which is measured by the proportion of female employment to total employment. I hypothesized that an increase in the minimum wage standard has a crowding-out effect for female employers and enlarges the employment gap between males and females in the urban sector.

After controlling for economic growth, urbanization level, job availability, regions, and some demographic factors, such as working age population and educational expenditure, the results of all my models are consistent and conform to my hypothesis that there exists a statistically significant negative correlation between the minimum wage and the relative female employment rate. The empirical study indicates that increasing China’s minimum wage would enlarge the gender employment gap and would bring relatively fewer benefits for females especially in provinces and regions with lower living standards.

Another finding that worth to mention is that, a priori, I expected that economic development and increases in educational expenditure would contribute to closing the gender employment gap in China, because advanced economies, with higher female educational attainment, generally have a more balanced gender employment structure. I was surprised, however, to find that an increase of educational expenditure and overall economic output have negative impacts on female employment, which indicates that they disproportionally benefit males in contemporary Chinese society. On the contrary, instead
of GDP and educational investment, the urbanization level plays an important role in increasing female participation in the formal labor market.

Also, this study reveals the huge regional differences within China. The gender employment gap is much larger in western and middle provinces than in eastern provinces, which reminds the policy makers to pay more attention to regional disparities and develop different policies according to the regional development level.

In summary, this study has yielded some interesting results and my use of a new dependent variable - the proportion of female employment to total employment – separates this study from existing analysis. By evaluating the effect of an increasing minimum wage on the proportion of female employment to total employment, I contribute new evidence on adverse female employment effects to the current body of literature.

8.2 Policy Recommendations

According to the findings of this study, I have the following policy recommendations.

First, my empirical study shows that increases in the minimum wage has a negative impact on the proportion of female employment in urban units. Since 1994, frequent increases in the minimum wage standard across China have already caused certain pressures on the labor demand side due to higher labor costs. Although some scholars believe that China’s minimum wage is not very high above the market clearing wage, in some low-income industries, the minimum wage has actually approached or exceeded the average wage of the industry. These increases in the cost of labor will inevitably increase
the requirements for employees and lead to discrimination in terms not only of gender, but also of age, experience, and other factors.

Before I discuss the correct minimum wage level, I believe it is more important to explore a better and more scientific way to adjust China’s minimum wage standard. According to the minimum wage regulations, the province, autonomous regions and the municipalities level governments set their own minimum wages based on economic factors; However, this method only takes provincial differences and average development level of each area in to account, without considering the differences between different industries, which leads to the minimum wage standard being too low in high-income industries and puts pressure on low-income industries bearing relatively higher labor costs. In the former scenario, the minimum wage is less effective in terms of ensuring the basic incomes for low-income groups and their families, while, in the later scenario, the minimum wage damages the structural balance of employment, including gender structure. As a result, it might be beneficial to include industrial factors when setting minimum wage standards.

In addition to taking the industry into consideration, local governments should pay more attention to female employees’ welfare. Female benefits tend to be over-estimated if the government only focuses on the effect of the minimum age on the gender wage gap. However, narrowing of the wage gap is at the expense of expansion of the gender employment gap. Blindly raising the minimum wage standard will push female employees, especially low-skill female employees, into a more disadvantaged position. Knowing this trade-off and realizing the importance of the gender wage gap and gender employment gap balance is essential for policy makers to improve female welfare.
Second, my study shows that overall economic growth does not lower or eliminate the gender employment gap, but instead it further increases gender differences in employment. I expected that rapid economic development would result in a diverse and balanced labor needs, which would naturally close gender differences. Although I cannot conclude a causal relationship from my results, the statistically significant negative coefficient of GDP on the gender employment gap reveals that this expectation is not met in China. On the contrary, urbanization level tends to increase female employment. The higher the urbanization rate is, the smaller the gender employment gap will be. Combining those two results, I realize that economic output growth itself is an inadequate solution for the unbalanced gender employment structure. Instead of only focusing on policies that increase economic productivity, the government should make extra efforts to develop policies which make economic development consistent with labor market development, such as adjusting economic development goals, improving the industrial structure and promoting the urbanization process. The increase of economic productivity is only one part of the story of economy development. The core question that policy makers should bear in mind is how to develop China’s economy in a healthy and coordinated manner.

Third, China needs to improve the educational attainment of its female workforce in order to promote gender employment equality. The relatively low education level for women is a key constraint for the female workforce. I would argue that the reason why females are more vulnerable and sensitive to changes in the minimum wage is that females have a larger low-skilled working population clustering at the wage floor. Both the Chinese central government and local governments are making efforts to improve the
overall educational attainment. We can see such efforts from the constantly growing proportion of public educational expenditure to local GDP. However, my study sheds lights on another perspective – the increase of public educational funding does not help to improve female employment conditions, but instead exacerbates the gender employment gap. The results indicate that the growth of national educational expenditure disproportionately benefits males. It reminds us that the increase of total educational expenditure does not necessarily increase the relative educational resources for females at the same time. For example, especially in poor rural areas, households prefer to send boys rather than girls to get higher education when they have the access to limited national educational funding. Under the growing but still limited educational funding and the traditional unequal view of genders, the result of an overall increase of educational investment is to consolidate and strengthen gender differences. To change this situation, the Chinese government must shift the focus from the quantity of educational expenditure to the quality of the investment. The most important work for local governments is to regulate the use of educational expenditures, making sure all children, regardless of gender, can finish a compulsory nine-years of education. Furthermore, it would be beneficial to launch higher educational programs or to provide higher educational subsidies that target females. Policy makers need to recognize female education as a powerful driving force of economic growth and to allocate sufficient educational resources for improving the female workforce’s educational attainment.

Fourth, my study shows big differences between regions. For each individual region, the minimum wage standard plays an important role in stabilizing employment, attracting labor and protecting the rights and interests of workers. On the one hand, local
governments should make timely adjustments in the minimum wage according to local economic development and labor structure to ensure the healthy development of the local labor market. On the other hand, while taking provincial characteristics into account, the local government should also consider the impacts of neighboring areas due to gaming and cooperation between provinces and regions. The ability to adjust the flow of labor between regions and balancing the overall labor structure is an essential characteristic for an appropriate minimum wage standard.

Finally, a pressing need for the Chinese government is better data, especially about informal sector employment and county level data. A better understanding about the size of the informal sector and its role in affecting the gender employment gap can help local governments regulate the informal sector and promote female employees’ welfare. Also, there is no detailed county level data in current databases. The lack of economic data, educational attainment data and demographic data make it impossible to study the effects of the minimum wage on the gender employment gap at the county level; however, using provincial level data, like I did in this study, ignores the uneven development within each province and may cause bias. Moreover, more information about county level development can help policy makers better evaluate the effect of government programs and investments, such as identifying whether increasing educational expenditures lead to an increase in female educational attainment in a poor county. Last but not least, slow data updates by the Chinese government greatly degrade the usefulness of data. Generally, the soonest data that can be obtained is one or two years after they occurred. Updating the data quarterly will allow for more timely and higher quality policy research.
9. APPENDIX: ADDITIONAL RESULTS

Table A1: Results of the Hausman Specification test

<table>
<thead>
<tr>
<th>Coefficients</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(b)</td>
<td>(B)</td>
<td>(b-B)</td>
<td>sqrt(diag(V_b-V_B))</td>
</tr>
<tr>
<td>random</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fixed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnwage</td>
<td>-1.563322</td>
<td>-.9964858</td>
<td>-.5668359</td>
<td></td>
</tr>
<tr>
<td>lngdp</td>
<td>-.2257116</td>
<td>-.7940476</td>
<td>.568336</td>
<td></td>
</tr>
<tr>
<td>urbanization</td>
<td>.03858</td>
<td>.0366272</td>
<td>.0019528</td>
<td></td>
</tr>
<tr>
<td>unemployment</td>
<td>-.3096261</td>
<td>-.2965173</td>
<td>-.0131088</td>
<td></td>
</tr>
<tr>
<td>cpi</td>
<td>.0077343</td>
<td>.0112109</td>
<td>-.0034766</td>
<td>.0038641</td>
</tr>
<tr>
<td>laborsupply</td>
<td>-2.269775</td>
<td>2.298538</td>
<td>-4.568314</td>
<td></td>
</tr>
<tr>
<td>edugdp</td>
<td>-.0268514</td>
<td>-.0010518</td>
<td>-.0257996</td>
<td></td>
</tr>
</tbody>
</table>

b = consistent under H0 and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under H0; obtained from xtreg

Test: H0: difference in coefficients not systematic

\[ \chi^2(7) = (b-B)'[(V_b-V_B)^{-1}](b-B) \]
\[ = 81.50 \]
\[ \text{Prob}>\chi^2 = 0.0000 \]
\((V_b-V_B \text{ is not positive definite})\)

Table A2: Results of the Linktest

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 551</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>1901.92562</td>
<td>2</td>
<td>950.962811</td>
<td>F(2, 548) = 194.32</td>
</tr>
<tr>
<td>Residual</td>
<td>2681.8432</td>
<td>548</td>
<td>4.89387445</td>
<td>Prob &gt; F = 0.0000</td>
</tr>
<tr>
<td>Total</td>
<td>4583.76882</td>
<td>550</td>
<td>8.33412513</td>
<td>R-squared = 0.4149</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Adj R-squared = 0.4128</td>
</tr>
</tbody>
</table>

| femaleratio | Coef. | Std. Err. | t     | P>|t|  | [95% Conf. Interval] |
|--------------|-------|-----------|-------|-----|-------------------|
| _hat         | -.0828437 | 1.851876 | -0.04 | 0.964 | -3.720489 | 3.554801 |
| _hatsq       | .0146223 | .0249975 | 0.58  | 0.559 | -.0344805 | 0.063725 |
| _cons        | 19.9969 | 34.23738 | 0.58  | 0.559 | -47.25567 | 87.24947 |
Table A3: Results of the Ovtest

```
. ovtest

Ramsey RESET test using powers of the fitted values of femaleratio
   Ho: model has no omitted variables
   F(3, 537) =  1.34
   Prob > F =  0.2617
```

Table A4: Results of the Vif Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnmwage1</td>
<td>4.55</td>
<td>0.219785</td>
</tr>
<tr>
<td>lngdp</td>
<td>4.55</td>
<td>0.219858</td>
</tr>
<tr>
<td>urbanization</td>
<td>3.70</td>
<td>0.270392</td>
</tr>
<tr>
<td>edugdp</td>
<td>2.65</td>
<td>0.376855</td>
</tr>
<tr>
<td>laborsupply</td>
<td>2.50</td>
<td>0.399358</td>
</tr>
<tr>
<td>west</td>
<td>2.39</td>
<td>0.418228</td>
</tr>
<tr>
<td>municipality</td>
<td>1.72</td>
<td>0.582482</td>
</tr>
<tr>
<td>middle</td>
<td>1.59</td>
<td>0.627004</td>
</tr>
<tr>
<td>unemployme~e</td>
<td>1.22</td>
<td>0.817243</td>
</tr>
<tr>
<td>cpi</td>
<td>1.17</td>
<td>0.853427</td>
</tr>
</tbody>
</table>

Mean VIF 2.61
10. BIBLIOGRAPHY


