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Employment Discrimination of Chinese Unmarried Women

Abstract

Employment discrimination has been existed through the history and gender discrimination is one of the most common one. The discrimination against women is the most discussed one but the discrimination against unmarried women is easily ignored. While comparing women and men, marital status is considered as one of the factors that decreases women's competitiveness. However, the marital status, as some people complain, turns into a potential advantage while comparing two equally qualified women. This study focuses on main questions: 1) Does the discrimination against unmarried women while comparing with married women really exist, or is it just reasonable selection? 2) If the discrimination exists, how much do unmarried women suffer in both employment rate and income aspects? 3) Does the education level play an important role in the discrimination? China is facing fifteen million people in employment pressure annually. No matter how small the discriminatory proportion is, it becomes a huge social problem due to the huge base number. The econometric part shows the existence of discrimination in both employment rate and income. Unmarried women are facing a lower employment rate at certain ages and the unmarried women with primary education or secondary education are facing a lower income.

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Employment Discrimination of Chinese Unmarried Women

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Jifan Huang

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Employment discrimination has been existed through the history and gender discrimination is one of the most common one. The discrimination against women is the most discussed one but the discrimination against unmarried women is easily ignored. While comparing women and men, marital status is considered as one of the factors that decreases women's competitiveness. However, the marital status, as some people complain, turns into a potential advantage while comparing two equally qualified women. This study focuses on main questions: 1) Does the discrimination against unmarried women while comparing with married women really exist, or is it just reasonable selection? 2) If the discrimination exists, how much do unmarried women suffer in both employment rate and income aspects? 3) Does the education level play an important role in the discrimination? China is facing fifteen million people in employment pressure annually. No matter how small the discriminatory proportion is, it becomes a huge social problem due to the huge base number. The econometrics part shows the existence of discrimination in both employment rate and income. Unmarried women are facing a lower employment rate at certain ages and the unmarried women with primary education or secondary education are facing a lower income.

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Chapter One: Introduction

China is facing annual employment pressure of fifteen million occupations demand and most of them are urban employment pressure.¹ High unemployment rate is always considered as one of the most important factors leading to social instability. Since China occupies almost one fifths global population, every small social problem is able to cause huge problem and every hidden danger that might cause social problem has to be dealt with seriously. The discrimination against unmarried women is likely to become one of the hidden threats.

Some have argued that the so called discrimination is only reasonable selection. Comparing with male, female has physiological disadvantage and disadvantage in family division. The physiological disadvantage is obvious that female women's strength is weaker. In 2014, 10% of the whole urban employed male population is engaged in the construction industry and 8.2% of the whole urban employed male population is engaged in the transport, storage and post industry. During the same period, only 2.3% of the whole urban employed female population is engaged in the construction industry and 2.4% of the whole urban employed female population is engaged in the transport, storage and post

¹ According to the speech of director of Institute of International Labor and Social Security, Ministry of Human Resources and Social Security in 2016.
<http://finance.sina.com.cn/china/gncj/2016-07-14/doc-ifuapvs8416880.shtml>

industry.² Considering the female proportion of the whole employed population is 44.8%,³ it turns out 84.3% of the construction industry is occupied by male workers and 80.8% of the transport, storage and post industry is occupied by male workers. This shows the dominance of male in such categories that is highly physical power required. Another disadvantage that has been frequently discussed is the role of female in family division. Women have usually been considered as the role that should take more responsibility in housework and raising children in both USA⁴ and China⁵. Therefore, women have to spend more time and energy on family issues and this situation makes them less competitive. Even it is true, they are not the only factors that influence women's employment rate and income, especially for the unmarried women who do not have the responsibility of family issues at all.

According to a survey held in several universities in Shanghai, 63.7% of female graduates and 47.6% male graduates believe there is employment discrimination against female graduates.⁶ Furthermore, according to a survey held by Ministry of Labor and Social Security in sixty-two cities, 67% of the employers asked for marital status and among the more detailed questions, relationship status (58.9%), plan of marriage (42.9%),

² China Population and Employment Statistics Yearbook 2015, 3-17: Urban Employed Persons by Age, Sex and Sector

³ 2014 *China Women's Development Program(2011--2020)* Implementation Statistics Report
http://www.stats.gov.cn/tjsj/zxfb/201511/t20151127_1282257.html

⁴ Condran J G, Bode J G. Rashomon, working wives, and family division of labor: Middletown, 1980[J]. *Journal of Marriage and the Family*, 1982: 421-426.

⁵ Anqi Xu, couple's power and women's family status evaluation index: reflection and review [J]. *Sociological Research*, 2005, 4(1)

⁶ Implementation Report on the Program for the Development of Chinese Women and Children in Shanghai
<http://www.shanghai.gov.cn/nw2/nw2314/nw9819/nw9822/u21aw179147.html>

plan of child birth (49.1%) and work intent after child birth (40.9%) are the most frequently asked questions.⁷

Any question that asks a candidate to reveal information about marital status topic without the question having a job related basis will violate the various state and federal discrimination laws in United States of America.⁸ However, there is no law against such questions during job interview or resume for record in China so the employers can ask for marital status freely. It is true that the employees can fake the marital status during interview and this action will not be considered as fraud because the marital status is not necessary for employers to evaluate the capability and workers do not owe the duty of truthfully informing.⁹ But the employees are usually on the weaker side in the employment because the promotion and dismissing are controlled by the employer to a great extent. As a risk-taking side, the employee usually does not cheat on this question and this provides the conditions for employers to make discrimination.

The reason that marital status is the most frequently asked is the effect of Chinese fertility situation, government policy and statistics discrimination. In Europe, most countries are classified into very low fertility and some of those countries are facing lowest-low fertility situations which means the fertility rate is smaller than 1.3.¹⁰ Japan, a country that shares similar Asian culture, is also experiencing a lowest-low fertility. In China, even

⁷ The Second Sample Survey of Social Status of Chinese Women
http://www.stats.gov.cn/tjsj/tjgb/qttjgb/qgqttjgb/200203/t20020331_30606.html

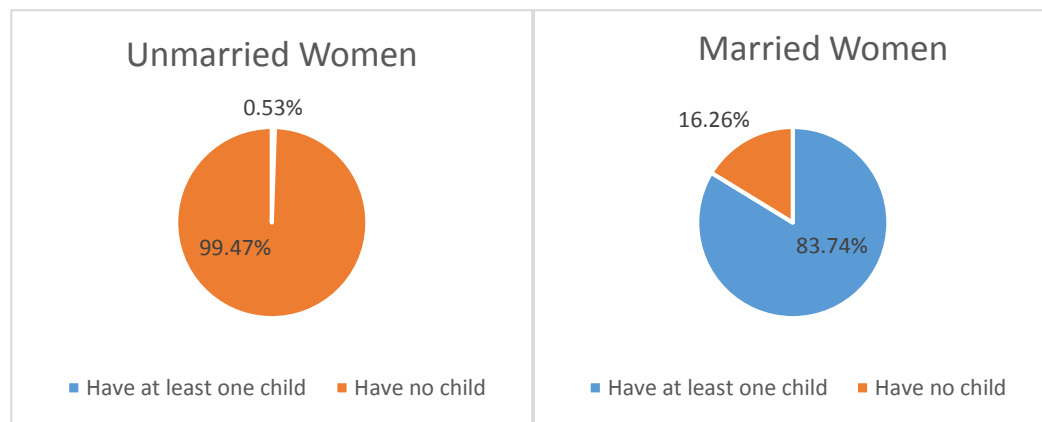
⁸ Said by Lori Adelson, a labor and employment attorney.
<https://www.businessinsider.com.au/11-illegal-interview-questions-2013-7#have-you-ever-been-arrested-1>

⁹ Said by Mingqing Yu, deputy director of Regulations Department, Ministry of Human Resources and Social Security
<http://china.findlaw.cn/laodongfa/laodongdongtai/1114452.html>

¹⁰ Billari F, Kohler H P. Patterns of low and lowest-low fertility in Europe [J]. Population studies, 2004, 58(2): 161-176.

under the influence of one-child policy for almost 25 years, the fertility rate is 1.6¹¹ which means every woman is raising 1.6 child on average. Also, China is a relatively traditional country in general, unmarried pregnancy is not encouraged or perhaps regarded as taboo¹² in some areas and procreation is considered as a very important part of marriage. The following figure shows the proportion of unmarried women (from 20-year old to 35-year old) who have at least one child and the proportion of married women (from 20-year old to 35-year old) who have at least one child.¹³

Figure 1



Among unmarried women, there are only 0.53% population are raising child. Among married women, there are 83.74% population are raising child. Besides this statistical results, several regulations can explain the phenomenon more. If the woman is having a child before getting married, she will face a penalty called social upbringing charges.¹⁴ In

¹¹ The data is claimed by The World Bank
<http://data.worldbank.org/indicator/SP.DYN.TFRT.IN?>

¹² In some areas, if the bride is pregnant before marriage, the people who know about this should avoid attending the wedding.
<http://mt.sohu.com/20151018/n423521139.shtml>

¹³ Data source: Chinese Household Income Project (2008), Urban Household Survey

¹⁴ Law of the People's Republic of China on Population and Family Planning, Art.41

order to cooperate with one-child policy, abortion is legal in the whole country. For the unmarried women who get pregnant, they do not have to give birth. Therefore, the marital status is highly correlated with fertility status.

The one-child policy had gone into effect from 1980 to 2015 and it has been replaced by two-child policy since 2016 to response the coming aging society in few decades.¹⁵ If the married women is already having a child, she is not legitimately eligible to raise the second child before 2016.

The statistical discrimination pioneered by Kenneth Arrow (1973) and Edmund Phelps (1972) claimed that due to the absence of direct information about a certain fact of ability, a decision maker would substitute group averages.¹⁶ Under incomplete information conditions, the employers can save time and money by doing this to achieve higher benefit. On one hand, investigating fertility status costs more and it will increase the risk of getting sued for discrimination¹⁷ because the question of fertility status is more obvious to be considered as a discrimination. On the other hand, Chinses tradition and one-child policy make employers treat all married women as the women who already have a child and no plan for another child.

It is not possible to prove that marital status is always used as a proxy for fertility status for discriminatory purposes, but it is our speculation that this is commonly the case.

¹⁵ Since 2016, a family is allowed to have two children in total according to the new change of *Law of Population and Family Planning*. Before 2016, each family can only have one child, more children will be considered as breaking the law.

¹⁶ Fang H, Moro A. Theories of statistical discrimination and affirmative action: A survey[R]. National Bureau of Economic Research, 2010.

¹⁷ We certainly have the law protection against employment discrimination (Labor Law of the People's Republic of China Act 12), but we do not have the law against questions about private information. It is less risky by just asking marital status rather than asking fertility status for the latter question is easier to be identified as evidence against employers.

Furthermore, some statistical results support the plausibility of this assumption. First, the statistics results provide the foundation. Almost none of single woman is raising a child and most of married women are having at least one child. It means the employers are able to use marital status as a proxy of fertility status. Second, the discrimination against unmarried women has officially been confirmed by the supreme power in China. During the press conference of 5th Session of 12th National People's Congress held on March 4th 2017, the deputy Secretary-General Ying Fu claimed, employment discrimination has existed for a long time and there are indeed some young unmarried women facing unfair treatment during employment. She also presented an example on the press conference, once a man told her that he just finished a recruitment work and he rejected a young woman with very good qualifications. He said there are few people in his department, if there comes a childbearing age female employee and have two children after, his department's working efficiency will be influenced.¹⁸ The National People's Congress is the organization of supreme authority in China¹⁹ and the content delivered to media at the press conference has to be very important. We cannot make sure that marital status is always used as a proxy of fertility status. But it can be used as a proxy, and it has been abused so seriously that a national leader pointed it out on the press conference.

Based on Becker's taste-based model (1957), Youbao Zhao (2005) claimed the solutions of decreasing discrimination against unmarried women is cutting off the

¹⁸ Ying Fu, the chairperson of National People's Congress Foreign Affairs Committee
Ying Fu: After two-child policy, female employment discrimination is more prominent
<http://yanglao.china.com.cn/roll/2017/0305/1345.html>

¹⁹ Constitution of People's Republic of China, Art 2.2

naturally-attached costs that employers are facing as much as possible but no actual feasible policy is assumed under Chinese conditions.²⁰

Overall speaking, the difference between an unmarried woman and a married woman becomes the core part of this research. Specifically, we investigate whether there are measurable negative effects in terms of employment and income for being single that can be attributed to discrimination against unmarried women.

²⁰ Youbao Zhao. Anti-sexism in Job-Hunting: An Economics Analysis[J] Journal of Shandong University of Science and Technology: Social Science, 2005, 7(1):70-74

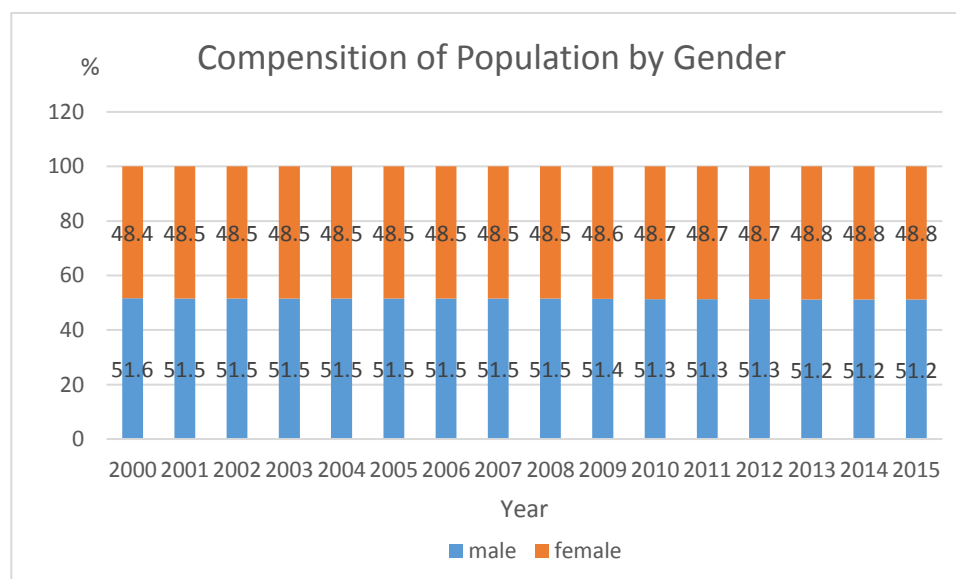
Chapter Two: Chinese Social Structure and Labor Market

This chapter is providing the basic related background of Chinese labor market, social structure in order to help understand the Chinese special conditions so that I can further explain the employment discrimination of unmarried women.

Main Indicators of Chinese Social Structure

China is a country that population of male is significant more than that of female. But the proportion of male is decreasing through 2000 to 2015 as shown in the following figure:²¹

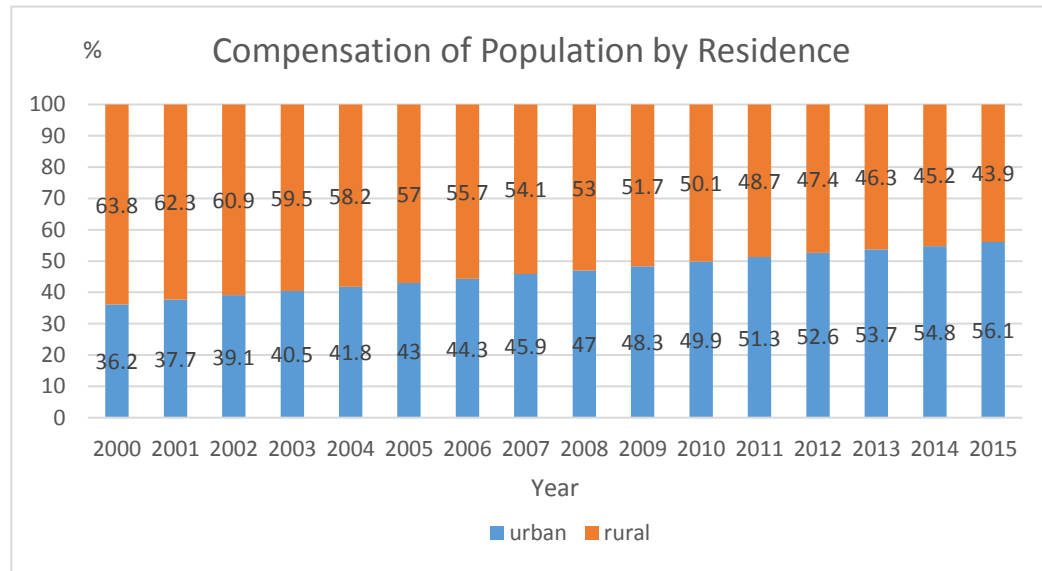
Figure 2



²¹ China Labor Statistical Yearbook, from year 2001 to year 2016

The population in urban and rural areas have changed a lot through years. In 1952, the proportion of rural residents is 87.5%, but it reached to 43.9% at the end of 2015.²² That is, the proportion of urban residents increased from 12.5% to 56.1% from 1952 to 2015. This urbanization is considered as one of the important index that marks China's transition from agricultural country to industrial country.²³ The following figure is the compensation of population by residence from 2000 to 2015.²⁴

Figure 3:



Another important index that reveals the social structure is dependency ratio of population. The dependency ratio consists of children dependency ratio and old dependency ratio. The gross dependency ratio refers to the ratio of non-working-age population to the working-age population. The old dependency ratio refers to the ratio of

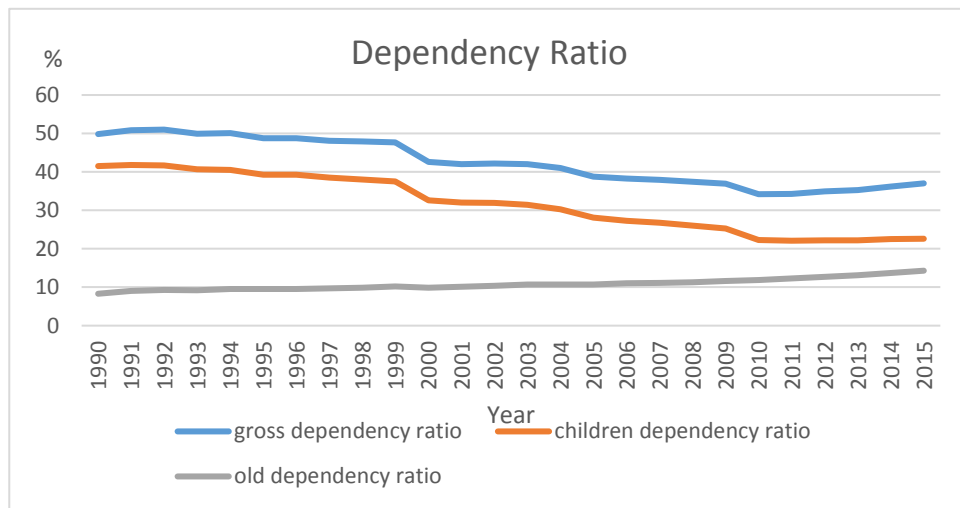
²² China Labor Statistical Yearbook 2015

²³ Houkai Wei, Yeqiang Wang, Hongjian Su. Comprehensive Evaluation Report on Urbanization Quality in China [J]. Economic Research Reference, 2013, 31(2)

²⁴ China Labor Statistical Yearbook, from year 2001 to year 2016

elderly population to the working-age population. The children dependency ratio refers to the ratio of children population to the working-age population. The gross dependency ratio is regarded as labor supply level. Smaller dependency ratio means less social burden.²⁵ Higher dependency ratio means more social urban because each labor is responsible for raising responsibility. The following figure shows the gross dependency ratio, children dependency ratio and old dependency through years.²⁶

Figure 4



The gross dependency ratio has significantly decreased since 1999 and it has been less than 40% since 2005. There is an increasing trend of gross dependency ratio since 2010 but it is still less than 40% level. As a comparison, the gross dependency ratio in Japan is 64% and the ratio in USA is 51% at the end of 2015.²⁷

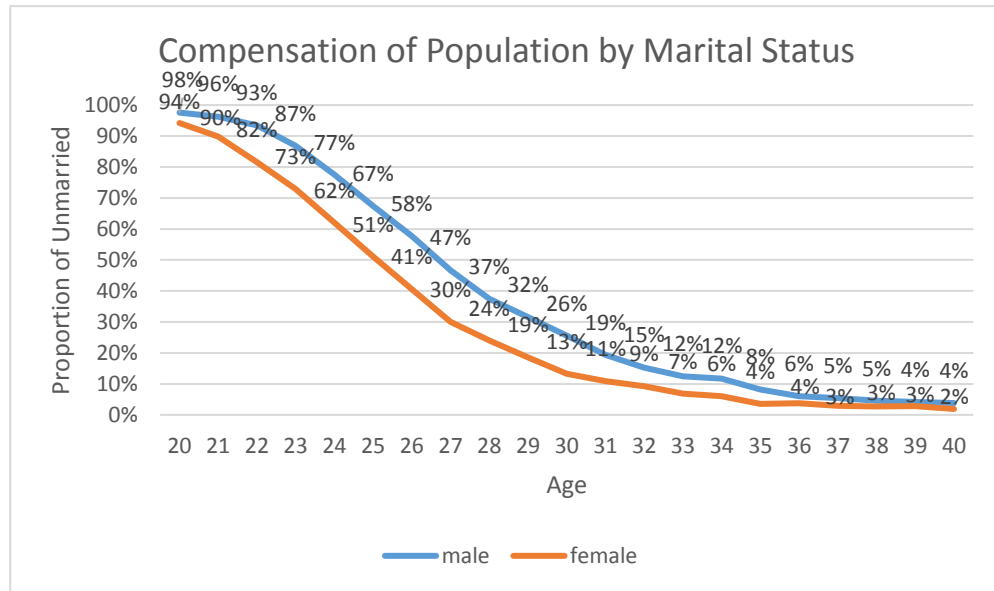
²⁵ Grasp the Opportunity of Demographic Window to Promote Social Harmony. Dec 26th, 2008
http://epaper.southcn.com/nfdaily/html/2008-12/26/content_6712557.htm

²⁶ China Statistical Yearbook 2016.

²⁷ Age dependency ratio (% of working-age population)
<http://data.worldbank.org/indicator/SP.POP.DPND>

Since this thesis focuses on the employment discrimination of unmarried women on the basis of future child-bearing, the composition of population by marital status is necessary to present. The data of both male and female is shown in the following figure.²⁸

Figure 5:

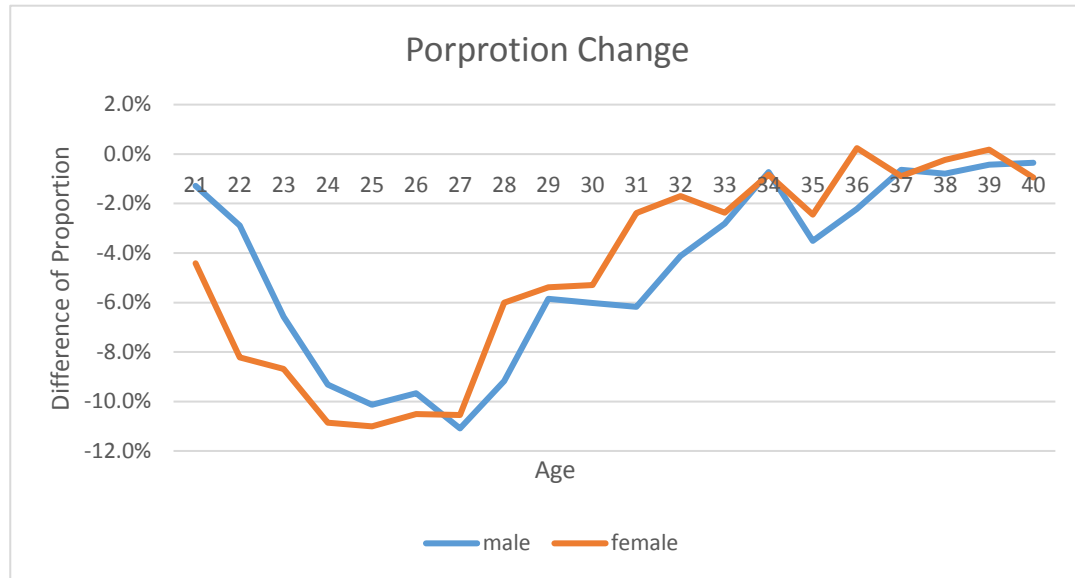


From the figure we can see that the proportion of unmarried men and women are both decreasing as age grows. Also, the proportion of unmarried men is higher than that of unmarried women at all ages.

When we focus on the change of proportion, we can estimate the rate of single people getting married. The following figure shows the proportion change of both men and women.

²⁸ China Labor Statistical Yearbook, 2016

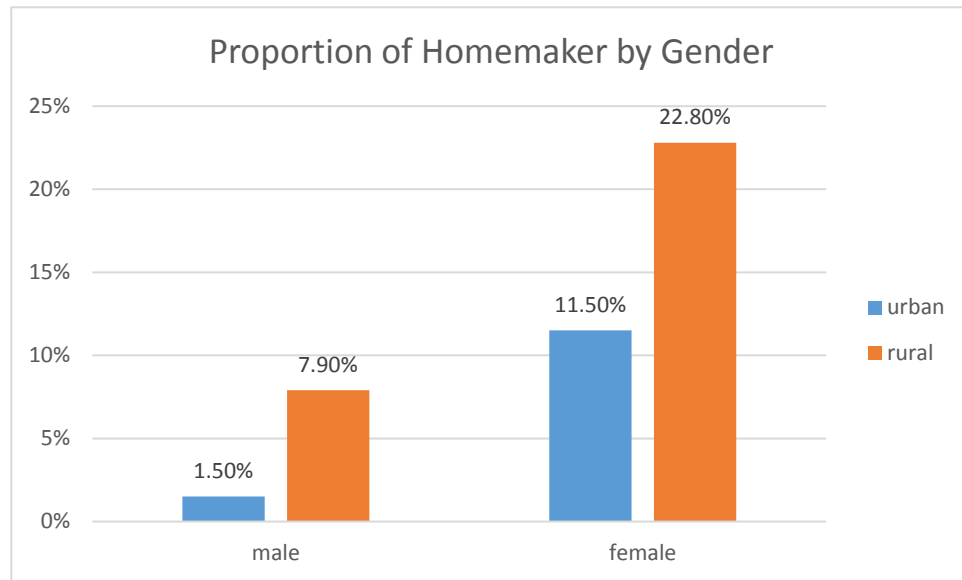
Figure 6:



Each data here represents the difference between proportion of single people at current age and previous age. For example, the data of female at age 21 is -4.4% which means the proportion of single women at age 21 is 4.4% smaller than the proportion of single women at age 20. Therefore, this figure can be considered as a proximate derivative of the function in figure 4. It shows that the proximate derivative function of male is decreasing from age 21 to 27 and it is increasing from 28. The proximate derivative function of female is decreasing from age 21 to 24, it remains still from 25 to 27 and it is increasing from 28. Therefore, the function of male in figure 4 is concave from age 20 to 27 and it is convex from age 28. The function of female in figure 4 is concave from age 20 to 23 and it is convex from age 28. The feature of a decreasing convex function is that the rate of change is decreasing, in other words, the rate of single men and women getting married is decreasing from age 28.

In Chinese families, the proportion of female homemakers is much larger than the proportion of male homemakers. The following figure shows the data.²⁹

Figure 7



From the figure7, we can see that in both rural and urban districts, female homemakers are much more than male homemakers. Also, both male and female homemaker proportions in rural districts are larger than that in urban districts. This implies there are more two-earner households in urban areas.

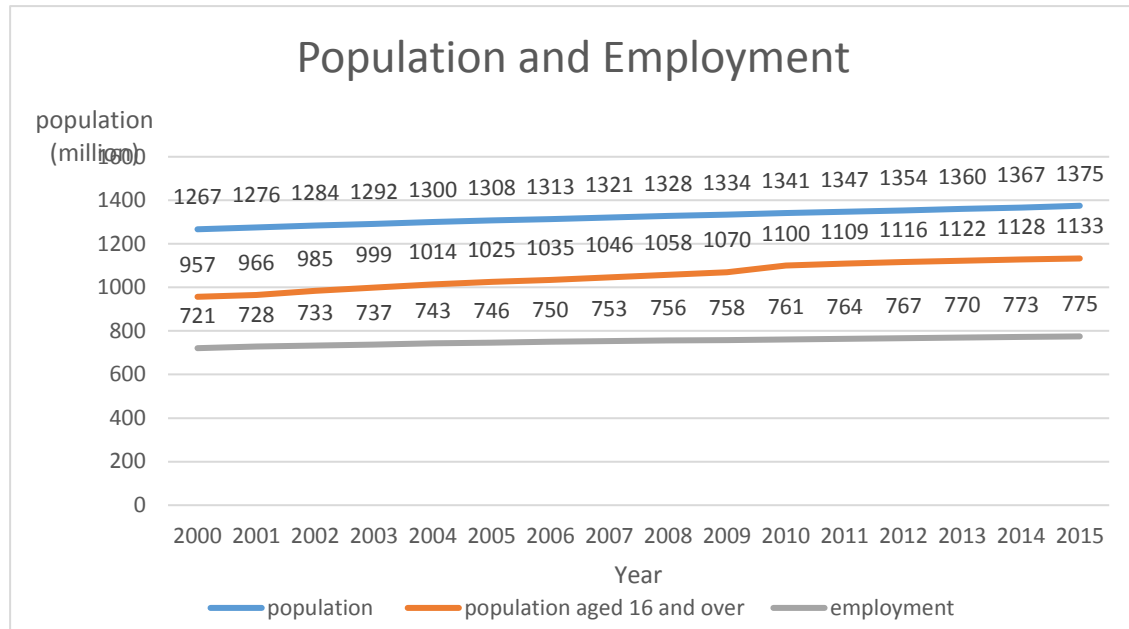
Main Indicators of Chinese Labor Market

The following sketch shows the total population, population aged 16 and over and employment from year 2000 to 2015.³⁰

²⁹ China Households Income Project 2014

³⁰ China Labor Statistical Yearbook, from year 2001 to year 2016

Figure 8

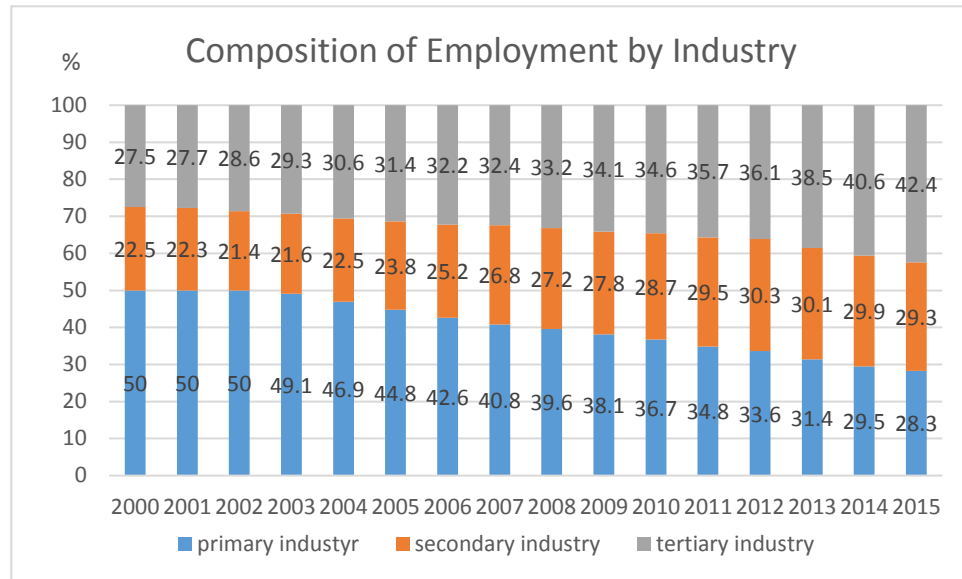


This sketch shows that whole population, population aged 16 and over and employment have all increased steadily since 2000. It is noticed that the change of population aged 16 and over between 2009 and 2010 is 30 million which is much larger than usual level. Before 2009, the annual change is basically between 9 to 15 million. After 2010, the annual change is basically between 6 to 9 million. Also, the annual increase in whole population is 5 to 8 million. Therefore, the increase of population aged 16 and over is abnormally huge. Since the legal age of employment is 16, we can conclude the employment pressure is larger in 2009.

The following figure shows the composition of employment by industry from year 2000 to 2015.³¹

³¹ China Labor Statistical Yearbook, from year 2001 to year 2016

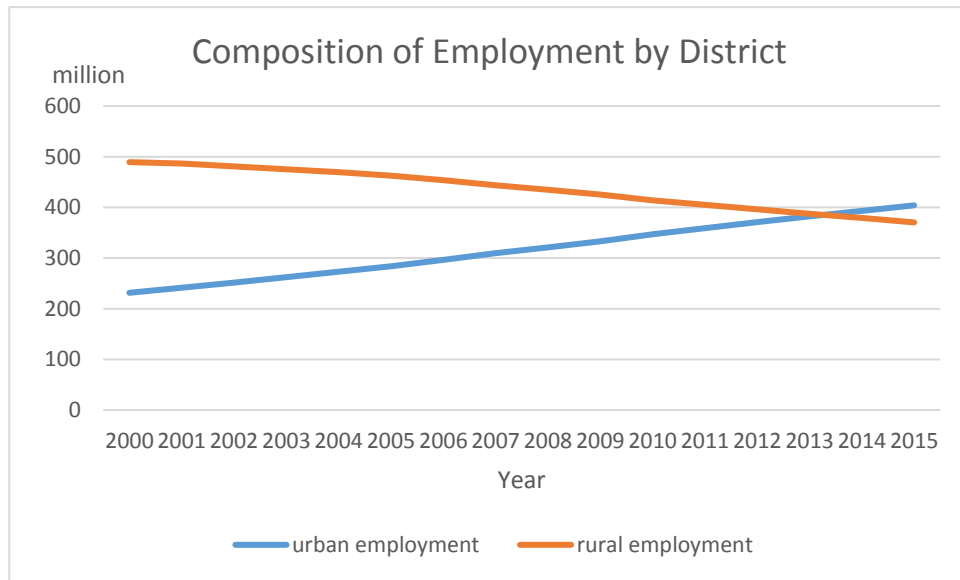
Figure 9



At the beginning of this century, the employment of primary industry occupies half of total employment and this situation remains for the next three years until 2003. From 2004, the proportion of employment in primary industry has decreased continuously and it only occupies 28.3% of whole employment at the end of 2015. The proportion of employment in secondary industry did not change much from 2000 to 2004, but it has begun to increase since 2005. At the end of 2015, the proportion of employment in secondary industry is 29.3%. The proportion of employment in tertiary industry has increased continuously since the beginning of this century from 27.5% to 42.2%. According to this sketch, the composition of employment by industry changed a lot from 2000 to 2015. The employment is dominated by primary industry in 2000, but it is dominated by tertiary industry in 2015. Also, both secondary industry and tertiary industry employment have increased significantly, primary industry employment is the only one that decreases.

As shown in figure 3, urban population is increasing continuously which necessary contributes to increasing urban employments. The following figure shows the composition of employment by district.³²

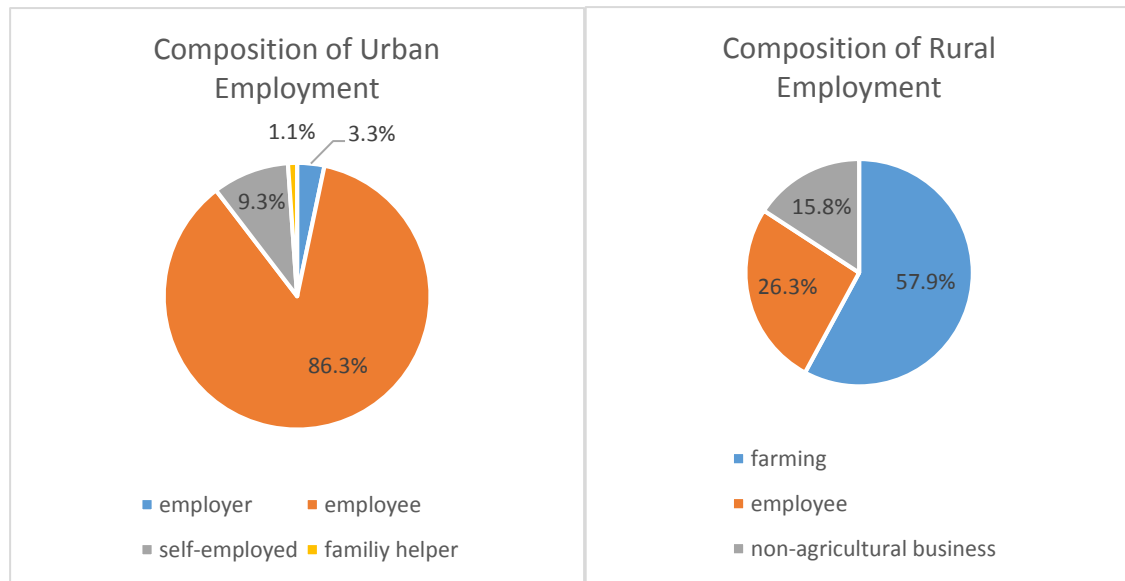
Figure 10



As shown in the figure, the urban employment is keeping increasing and rural employment is keeping decreasing. Due to the difference between rural and urban districts, the proportions of employers, employees and the self-employed are different in urban and rural employment.

³² China Labor Statistical Yearbook, from year 2001 to year 2016

Figure 11



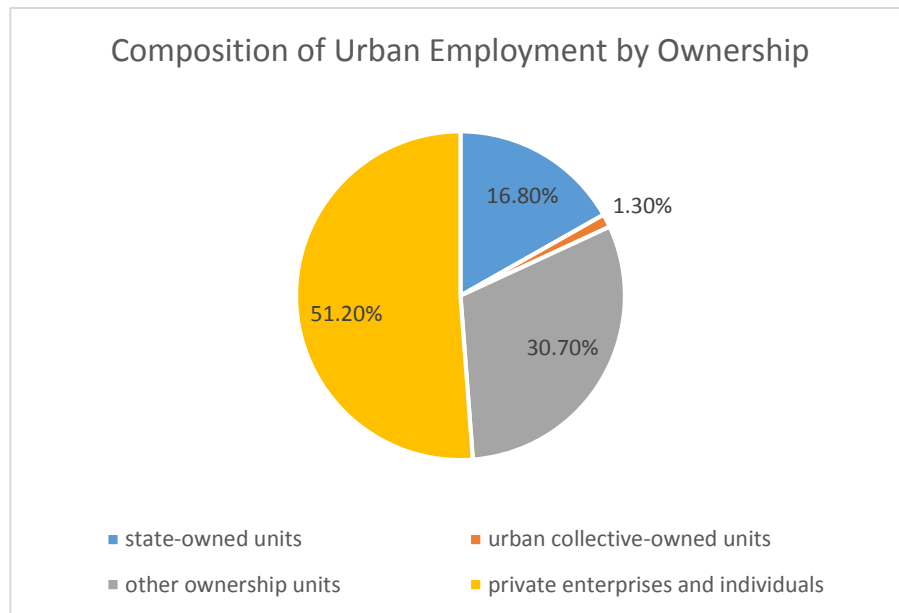
As it shown in figure 11, the proportion of employee in urban employment is 86.3% and the proportion of employee in rural employment occupies only 26.3%.³³ This is not strange because most of people in rural districts engage in agricultural activities and they are self-sufficient. But in urban districts, most of people have to find an occupation to feed themselves. Comparing with rural districts, labor market plays a much more important role in urban districts. This is the reason that I choose urban households data to study the employment discrimination of unmarried women.

There are several kinds of enterprises according to ownership. The units that more than half of property controlled by the government are named state-owned units. The units that more than half of property controlled by urban collective are named urban collective-owned units. The units that controlled by individuals and self-employed people are named private enterprises and individuals. All other types are classified as other ownership which

³³ Chinese Households Income Project 2014.

includes joint-stock units, joint venture unit, limited-liability companies and foreign companies.³⁴ The following figure shows the composition of urban employment by ownership by the end of 2015.³⁵

Figure 12



As shown in figure 11, over half of urban employments are employed by private enterprises or self-employed. The public ownership units, state-owned units and urban collective-owned units, occupies only 18.1% of urban employment. But at the end of 1995, the public ownership units occupies 94.2% of urban employment.³⁶

Since this study is concentrating on female, especially the unmarried female, the proportion of female employment is also another important indicator to understand female

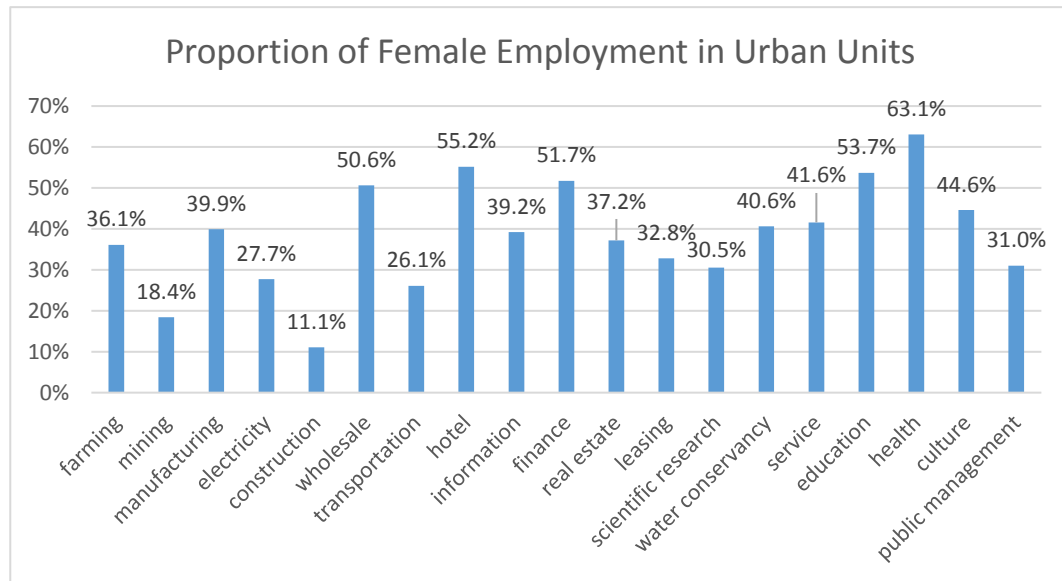
³⁴ Explanation of Main Statistical Indicators
<http://www.stats.gov.cn/tjsj/ndsj/yb2004-c/html/5i.htm>

³⁵ China Labor Statistical Yearbook 2016

³⁶ China Labor Statistical Yearbook 1996

employment conditions. The following figure is the proportion of female employment in urban units by sector.³⁷

Figure 13



This figure shows there are five categories where female employment proportion is higher than 50% and fourteen categories where female employment proportion is less than 50%. This data shows that female employment is less than male employment on average but we cannot conclude anything about employment discrimination without further discussion.

The Difference between Married and Unmarried Women

As I discussed in the introduction part, the unmarried and married women are treated differently not just because of the marital status, it is the fertility status that actually makes difference. The most important difference between a woman without child and a woman

³⁷ China Labor Statistical Yearbook, from year 2001 to year 2016

with a child is the pregnancy period. In the view of employers, the woman without child is almost certainly going to raise a child in the future sooner or later. However, before 2016, the woman who has already have a child is probably not going to raise another child at all. After hiring an unmarried woman, the employers must get prepared for the costs during women's coming pregnancy period. There are several reasons that employers are going to take the risk of both financial costs and potential costs.

Working Efficiency Decrease

First of all, women's pregnancy affects working efficiency significantly. It has been researched that 25.54% of pregnant women have anxiety problem and 19.84% of pregnant women have depression problem and it is unavoidable due to hormone.³⁸ Besides the mental issues, the pregnant employees are having three kinds of compulsory leave and three extra kinds of optional leave. Every pregnant employee has an extra hour per day if the pregnancy period lasts longer than seven months. That is, the pregnant employees are having an hour break every day during the last two months of her pregnancy period which is called **pre-maternity leave** and the night work is strictly prohibited.³⁹ Also, every woman who returned work after child birth are having an hour break for breastfeeding every day until the baby reaches his one-year-old birthday.⁴⁰ This kind of leave is called **breastfeeding time**. The last and the most important compulsory leave is **maternity leave**. According to *Special Provisions on Labor Protection for Women Workers*, pregnant women have the right to apply for maternity leave for ninety-eight days. Among the ninety-eight

³⁸ Yanqiong Zhao, Mujun Li, Yue Chen, Pregnancy Anxiety, Depression and Its Influencing Factors in Pregnant Women [J]. *Journal of Practical Obstetrics and Gynecology*, 2006, 22(10): 608-610.

³⁹ *Special Provisions on Labor Protection for Women Workers*, Art. 6.2.

⁴⁰ *Special Provisions on Labor Protection for Women Workers*, Art. 9.2.

days, fifteen days are prior to child birth and eighty-three days are after child birth.⁴¹ The other three optional leave has to be approved by employers before taking effect. The first optional leave is **optional pre-maternity leave**. Only the women who is at least seven month pregnant is qualified to apply for optional pre-maternity leave which lasts two and half months. The employer has full authority to determine whether approve or not so it depends on each firm's own regulations. The second optional leave is **breastfeeding leave**⁴² which lasts for six and half months. Only the woman after child birth who has trouble breastfeeding her child is qualified to apply for this kind of leave. This application will be evaluated by employers and they have the right to reject it. The last optional leave is **protection leave** and the duration depends. The protection leave is a little bit special because not every pregnant woman is qualified to apply for. Only the pregnant woman who has the proof issued by at least a rank two hospital of the sickness that might influence normal fertility is eligible. The approval is depending on every firm's own regulations of sick leave. Even it is optional and the employer has the right to reject the application, it is very rare that rejection happens in real life. Since the proof issued by the hospital is revealing the seriousness of the pregnant condition and pregnancy is pretty important to a family, employers usually approve that kind of leave. To avoid confusion, the following table is the summary.

⁴¹ Special Provisions on Labor Protection for Women Workers, Art. 7.1.

⁴² This **breastfeeding leave** is totally different from the **breastfeeding time**. **Breastfeeding leave** is optional and it can be rejected by employers, but **breastfeeding time** is compulsory and insured by law. Also, the duration is different. **Breastfeeding leave** can last for at most six and half months, but the **breastfeeding time** only provide one hour per day until baby is one-year-old.

Table 1

Compulsory	Duration	Optional	Duration
Pre-maternity leave	1 hour per day for 2 months	Optional pre-maternity leave	2 and half months
Breastfeeding time	1 hour per day until baby one-year-old	Breastfeeding leave	6 and half months
Maternity leave	98 days	Protection leave	Depends

Instability Increase

The on-going program or training has to suspend and some of them have to be abandoned due to the timeliness.⁴³ If someone is in charge of a program with a time limit of six months, the pregnancy will disorganize the program plan and even contributes to program cancellation. Changing the principal of the program temporarily will lead to extra cost and it is definitely not welcome by managers. If someone is in the middle of a pre-work training program and applying for the maternity leave, that will become a huge problem. Since the training program is occupying long period and is not held at any moment, it is held with a certain cycle annually. If the woman is applying for maternity leave, the employer has no choice but to approve according to the law. Therefore, this woman has to skip this cycle of pre-work training program and wait for the next. If one cycle takes one year, that means she has to attend work without basic training for 9 months which is one year minus three month maternity leave. Her competitiveness will be lower comparing with other colleges and she will face the potential risk of getting fired right after child birth.

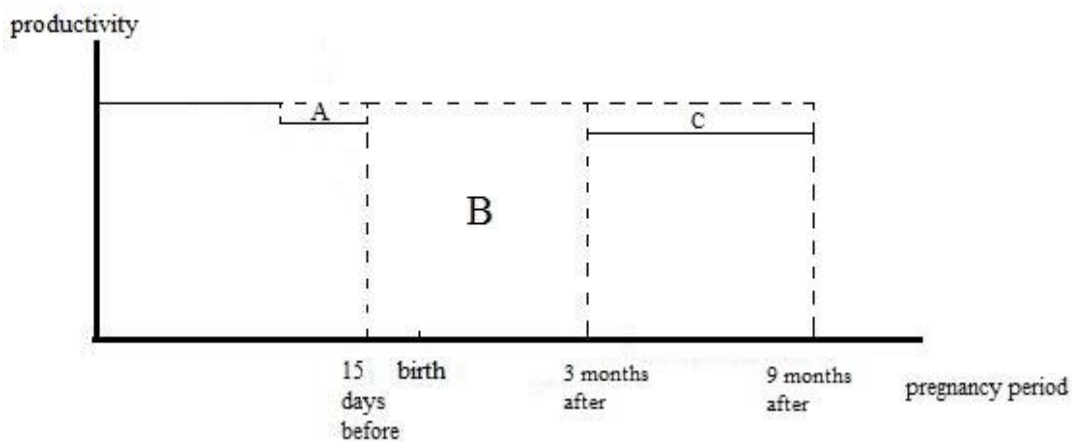
⁴³ Kangsi Z. On the Interaction of Gender Discrimination in Employment and Human Capital Investment Bias [J]. Journal of Zhejiang University (Humanities and Social Sciences), 2009, 5: 013.

If the protection leave is approved, situations will become more complicated because it cut the employee's working period into more pieces and it makes her less able to take charge of any program.

Financial Loss

Thirdly and more importantly, the employer has to pay for women's pre-maternity leave, breastfeeding time and maternity leave. During this period, employers has to pay full amount salary while they benefit nothing from these women. However, the financial loss is much more in real life. According to the law, women have the right to ask for a fifteen-day leave before child birth. But it does not necessarily mean the pregnant women can keep the working efficiency as much as it required during the rest of pregnancy period. In some employment categories, especially those with high physical labor requirements, pregnant women have to decrease their labor intensity in order to have sufficient rest. Also, employers usually give the pregnant women privilege in consideration of being polite and kind. Therefore, the financial loss is potentially increased as the shown in the following sketch.

Figure 14



Let the vertical axis be the productivity, let the horizontal axis be the pregnancy period. During normal period, the work-wage index should approximately be a constant number because it is determined by the employee's own ability of working efficiency. Fifteen days before child birth, the work-wage index should become zero because she delivers non work but still receive normal wage. This period ends at three months after child birth. When the employee come back to work after using up, she still receives wage for an hour breastfeeding time every day, so the work-wage index should be lower than it should be.

Due to physical inconvenience and pre-maternity leave, the employee's working efficiency is not possible to hold still during the pregnancy period. The work-wage index should, in fact, decrease along the time as the wage does not change. This period loss, which is area A, consists of the payment for pre-maternity leave. Therefore, the employers are facing more financial loss than it revealed by law. The second period loss is area B caused by the maternity leave. The third period loss is area C caused by breastfeed time.

Implicit Work Increase

The absence of pregnant women will increase the colleagues' work and it will make both employer and her colleagues bear more pressure. Let's assume everyone is dealing with the same amount of work y during a certain period, n workers in total and x workers that are taking the maternity leave. Therefore, the average work for every worker before someone is taking the maternity leave is:

$$y_1 = y$$

The average work for every worker who is still on duty after someone is taking the maternity leave is:

$$y_2 = \frac{yn}{n-x}$$

One way to verify the influence of worker amount on average work or the influence of absent pregnant worker amount on average work is taking partial derivative:

$$\frac{\partial y_2}{\partial n} = -\frac{yx}{(n-x)^2}$$

$$\frac{\partial y_2}{\partial x} = \frac{yn}{(n-x)^2}$$

In the first equation, the numerator and denominator are positive, therefore, the partial derivative of average work with respect to worker amount is negative. It means more workers will reduce the new average work and dilute the side-effect of the pregnant absence. If the total worker number is relatively much larger than absent pregnant worker. The new average work is almost the same as before which means the absent pregnant worker barely make a difference. But if the total worker number is not significantly huge, they will face a significant increase of average work. In the second equation, the numerator and denominator are positive, therefore, the partial derivative of average work with respect to pregnant worker amount is positive. It means the average work strictly increase as long as pregnant worker amount increases. It makes perfect sense because more pregnant workers will leave more unfinished work for their colleagues. Once there exist pregnant worker, the whole working group or department members are facing higher pressure and it is definitely not welcome by the employ.

The extra work for every rest worker should be:

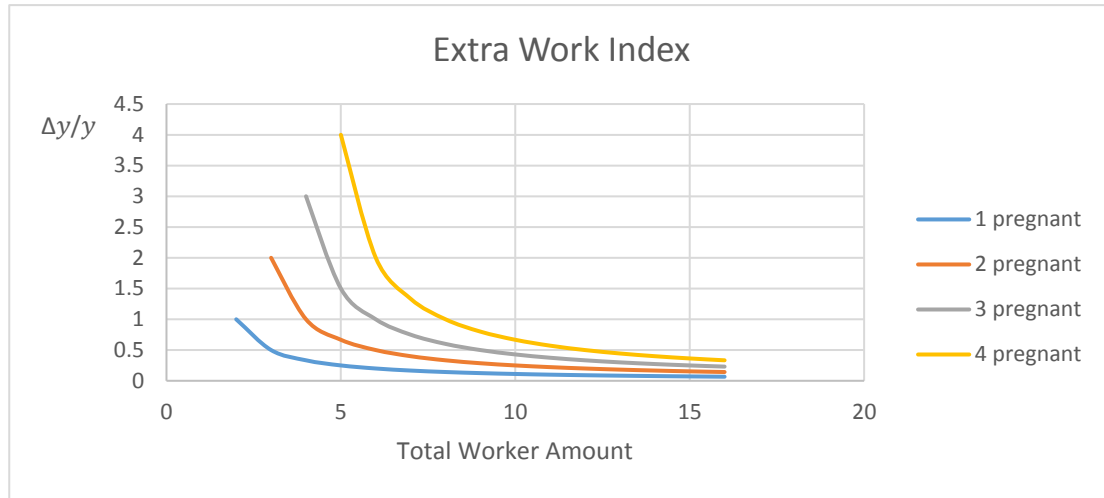
$$\Delta y = \frac{yn}{n-x} - y = \frac{yx}{n-x}$$

The coefficient of extra work should be:

$$\frac{\Delta y}{y} = \frac{x}{n-x}$$

This function can be sketched as:

Figure 15



As it shown in the graph, more pregnant workers lead to higher extra-work coefficient when worker amount holds still in every case. Furthermore, lower worker amount lead to higher extra-work coefficient in every case which means the scale of company matters. If the scale of company is relatively small, the scale of departments is expected to be small and the workers in the same department have to take relatively more work. In other words, the smaller companies suffer more from maternity leave. Let me take the Bank of Communication Jiangsu Province Branch as an example. The department of investment bank has only sixteen employees and seven of them are responsible for the bond business around the whole province. If one female employee is pregnant, the other six employees have to take 17% extra work on average. Otherwise, the department is facing 14% profit loss in bond business which is too huge to give up.

At the end of 2013, small and micro enterprises occupies 76.57% of the total amount of enterprises in China. Over 70% of new employment and reemployment are concentrated

in small and micro enterprises.⁴⁴ Since lots of provincial governments have issued new policies of tax concession and relief for small and micro enterprises⁴⁵, the proportion of small and micro enterprises is expected to increase continuously.⁴⁶

Unmarried Women's Advantages

The previous three disadvantages, instability increase, financial loss and implicit work increase are all coming from pregnancy. Except for the disadvantages, the unmarried women still have their own advantages comparing with married women. Childrearing may reduce the amount of effort available for married women to devote to work,⁴⁷ in other words, unmarried women have more available effort do devote to work.

Employer's Preference

According to the previous discussion, what employers worry about the unmarried women is not them being single. On the contrary, an unmarried woman has more advantage than a married woman. To the employers, the truth is they worry about those single women getting married and getting pregnant. Due to the one-child policy, the employers do not worry about a married woman having a second child.⁴⁸ To them, hiring an unmarried female might increase their cost.

The probability of an unmarried woman getting married becomes a risk of loss to the employers. Once an unmarried employee is hired, on one hand, the employer is benefitting

⁴⁴ Report on the development of small micro - enterprises in China, 2013
http://www.gov.cn/xinwen/2014-03/31/content_2650031.htm

⁴⁵ Notice on Further Strengthening the Implementation of Tax Preferential Policies for Small and Micro Enterprises, 2014, issued by State Administration of Taxation

⁴⁶ Junfeng Wang, Yan Wang. Research on the Development of Small and Micro Enterprises in China [J]. Business Research, 2012 (9):86-93

⁴⁷ Becker G S, Becker G S. A Treatise on the Family [M]. Harvard university press, 2009.

⁴⁸ When the employer hires a married woman, she probably already has a child according to the previous data.

from her more available effort, on the other hand, the employer is facing a risk of her being married and pregnant. It is easy to imagine that the employers are taking higher risk if the unmarried employees are very young and they are taking less risk if the unmarried employees are not young. If the risk of getting married is considered as a negative effect, the more available effort is considered as a positive effect, then the employer should weigh the positive effect and negative effect. If the negative effect is weighed more than positive effect, the employer is less likely to hire the unmarried woman. If the negative effect is weighed less than positive effect, the employer is more likely to hire the unmarried woman. Since the probability of getting married is not constant through aging, the risk that employers take should not be constant. If the unmarried women's advantage against married women is assumed as constant. The employers' preference should vary through different age. The detailed discussion is presented in the discussion chapter.

Maternity Insurance

Apparently, the cost of child birth is undertaken by both employee and employer. The part of cost that employers undertake is the main cause of the discrimination against unmarried women. If the fertility cost can be reduced, the discrimination phenomenon will be less serious. The fertility cost cannot disappear by itself, it can only be spread. Current maternity insurance is one example of spreading fertility cost but not an efficient way.

The current maternity insurance is one of the five basic employment insurances. The insurance premium is paid by employer and the monthly insurance premium rate has been limited to 0.5% of total salary in current month since October, 2015.⁴⁹ The main outcomes

⁴⁹ The former insurance premium was 0.6% to 0.8% of total salary. It was estimated this insurance premium rate decrease can help employers save 12 billion yuan per year.

of paying maternity insurance are medical service and childbirth allowance. The medical service covers the payment of necessary antenatal examination and medical care of childbirth. The childbirth allowance is paid to employers to make up for the cost of maternity leave.

There are few problems with current insurances. First, the medical service cannot be used in private hospitals, it can only be used in public hospitals. Second, the medical service covers only part of the total cost. For example, the medical service covers only 1400 yuan of antenatal examination at most and the exceeding part is taken care by pregnant women herself. Second, the amount of insured people with maternity insurance is much lesser than it should be. By the end of 2015, there are only 184 million people are insured by maternity insurance while there are 748 million people are insured by medical insurance at the same time.⁵⁰ Since the employers should pay the insurance premium for both male and female employees, most of the employers are not insured properly. Third, deduction of childbirth allowance happens sometimes. If the income of the pregnant woman is less than 60% of the average local income, the childbirth allowance is determined by 60% of the average income. Since the childbirth allowance is transferred to the company's account first and delivered to employees after, it is possible that the exceeding part of the childbirth allowance is hidden by employers on purpose. If the income of the pregnant women is more than 300% of the average local income, the childbirth allowance is determined by 300% of the average local income, the shortage should be complemented by employers. It is also possible that the shortage part is rejected by the employers. The fourth and the most

⁵⁰ 2016 Human Resources and Social Security Statistics Express issued by Ministry of Human Resources and Social Security on Feb 15th, 2017.

http://www.mohrss.gov.cn/SYrlzyhshbzb/zwgk/szrs/dtyjsu/201702/t20170215_266193.html

important reason is that legal supervision of maternity insurance is absolutely not enough⁵¹ and the result is that most of employees are not properly insured, as the data shown previously. In contrast, the legal supervision of maternity pay is very strict.⁵² Because the amount of pregnant employees are much lesser than the whole population of employees, it is easier for Human Resources and Social Security Bureau to provide help and obtain evidence. This leads to the situation that employers sometimes refuse to pay the maternity insurance premium without bearing legal liability but they do not take the risk of refusing to pay the maternity pay. For those employers, they tend to decrease the proportion of unmarried women to avoid the cost.

The current method of socializing maternity cost is not efficient, the cost needs to be further spread. A revision of this maternity insurance is going to be tested in 12 districts for one year from June, 2017.⁵³ The major change of current maternity insurance is combining medical insurance and maternity insurance and maternity insurance will no longer be paid separately. There are two results of this revision. The first impact is the amount of maternity insured employees will increase significantly. According to the previous data, 184 million people are insured by maternity insurance and 748 million people are insured by medical insurance. The amount of insured employee will increase by three times. The second impact is reduction of employers' cost. The current maternity leave is fully paid by employers, which is the main reason of unwilling to hire unmarried women. But the

⁵¹ Yongping Jiang. Reform and Perfection of Maternity Insurance System from the Perspective of Gender[J] Women's Studies, 2013(1): 47-53

⁵² Zijun Yu. A Study on the Legal Problems of Maternity Insurance for Female Workers in China[D] University of Anhui, 2015

⁵³ Maternity insurance and the basic medical insurance merger and implementation of the pilot program, issued by Office of State Council on Feb 4th, 2017

medical insurance premium is not fully paid by employers, employees also have to pay partially. According to the law, the employers need to pay 6% of the salary as the medical insurance premium and the employees need to pay 2% of the salary as the premium. Therefore, the employers are only required to pay 75% of total premium and the employees are responsible for the rest 25%. If the maternity insurance is included in the medical insurance, the employers will reduce 20% of the cost on maternity insurance premium. The first impact can enlarge the population to split the cost, so the premium rate is expected to decrease. The second impact allows employers' cost further decrease.

The Influence of Education Level

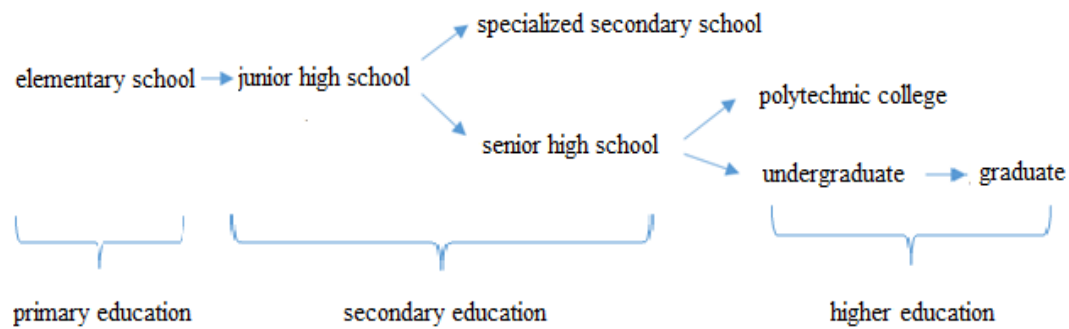
There are eight education levels and three ranks in total, the level beneath elementary school, elementary school, junior high school, senior high school, specialized secondary and technical school, polytechnic college, undergraduate degree and graduate degree. Elementary school degree is ranked as primary education. Junior high school, senior high school, specialized secondary and technical school are ranked as secondary education. Polytechnic college, undergraduate degree and graduate degree are ranked as higher education.

Note that the compulsory education level in China is junior high school. Usually people have the duty to spend six years in elementary school and three years in junior high school, but higher level is not compulsory. Therefore, there are two branches after finishing junior high school, senior high school or specialized secondary school. Both of them costs three years. This is different from the schools in USA because the junior high school in USA takes two years and senior high school takes four years. Since the specialized

secondary and technical schools are teaching professional working skills in many areas, students from there are more prepared to work in factory than those with only senior high school degree.

There are also two branches after finishing senior high school while those who finish specialized secondary school have no choice but to go to find a job. These two branches are polytechnic college and university. Polytechnic colleges are teaching higher rank skills than specialized secondary school, therefore, the students with this degree are expected to have higher salary than those with specialized secondary school degree. However, what people learned from polytechnic college are restricted within factory works and other areas alike. They are not as competitive as those knowledge in university. That is why people who graduated with undergraduate degree or graduate degree are rarer and get more paid. Here is the figure that shows the progressive relationship among these seven education levels.

Figure 16



It has been discovered that education level and certain industries are highly correlated in China.⁵⁴ Also, employees that belong to different kind of industry should share the similar characteristics. The following table will present this idea.

⁵⁴ Xuebing Qiao, Wenfan Yao, Dinghai Zhao. Research on the Relationship between Higher Education Structure, Graduates' Employment Structure and Industrial Structure [J]. Southeast University Journal, 2013, 4:030.

Table 2Urban Employed Female Classified by Education Level and Industry (%)⁵⁵

Education level	Farming, Forestry, Animal Husbandry and Fishery	Mining	Manufacturing	Production and Supply of Electricity, Heat, Gas and Water	Construction	Whole Sale and Retail Trades
Elementary	45.6	0.3	16.7	0.1	3.2	14.9
Junior	19.3	0.4	25.9	0.4	2.5	25.3
Senior	3.9	1.1	21.5	1.5	1.9	32.1
Polytechnic	0.9	0.7	15.5	2.2	2.4	18.8
Undergraduate	0.5	0.5	10.1	1.7	2.1	9.3
Graduate	0.1	0.4	6.9	0.8	0.7	4.3
Scientific Research and Technical Service	Management of Water Conservancy, Environment and Public Establishment	Services to Households, Repair and Other Services	Education	Health and Social Service	Culture Sports and Entertainment	Public Management, Social Security and Social Organization
0.1	0.7	4.8	0.7	0.6	0.6	0.9
0.2	0.6	5.5	1.5	1.0	0.8	1.2
0.6	0.7	4.7	3.9	3.9	1.2	4.1
1.4	0.9	2.7	10.7	10.9	2.3	9.4
2.1	1.1	1.2	21.4	11.2	3.1	13.4
6.7	0.8	0.5	32.8	12.5	3.7	10.8
Transport, Storage and Post	Hotels and Catering Service	Information Transmission, Software and Information Technology	Finance Intermediation	Real Estate	Leasing and Business Services	
1.1	6.4	1.1	0.6	1.0	0.6	
1.9	8.4	2.1	0.9	1.0	1.0	
3.2	6.3	3.4	2.4	1.7	1.9	
3.5	3.1	4.1	5.1	2.2	3.1	
2.7	1.4	4.6	7.9	1.7	3.9	
1.3	0.4	4.8	8.2	0.8	3.4	

⁵⁵ 2015 China Labor Statistical Yearbook, 3-19: Urban Employed Persons by Sex, Education Attainment and Sector

In table two, each data represents the proportion of corresponding education level in different industry categories, all the data within the same education level adds up to 100%. Let's take the first number 45.6 as an example. It means about 45.6% of the women with elementary school degree work in farming, forestry, animal husbandry and fishery industry.

Also, I pointed out the top three data in reach column to present the dominant education level in each employment category. Unfortunately, the data of specialized secondary and technical school degree is not recorded officially.

As it shows in the graph, the marked data is always adjacent except for the case of construction. Since the education degree is listed from the fundamental to the highest, it reveals that employers are always hiring people with certain education degree or with other similar degree. It is unlikely to happen that the employers are hiring both elementary school degree and undergraduate degree at the same time.

The more important phenomenon is that it shows strongly rank related. It means the education levels that belong to the same rank are much more likely to dominate in the industry category. There are nine categories are dominated by higher-education rank. There are four categories are dominated by both primary-education rank and secondary-education rank. There are five categories dominated by both secondary-education and higher-education ranks.

If we compare the primary-secondary-education dominant employment and higher-education dominant employment, we can find that primary-secondary-education dominant occupations are more labor-intensive and less technology required, the higher-education dominant occupations are more skill-intensive and higher technology required. It is not

unusual because these rank-one-dominant occupations require higher skills and knowledge which perfectly match the characteristics of polytechnic college and universities students.⁵⁶

Since primary-secondary-education dominant occupations require less skills or knowledge and the supply of labor in this rank is so huge that 81.3% of female are holding primary or secondary education degree⁵⁷, the employees that belong to primary-secondary-education dominant industries are more replaceable. In the view of employers, there are over four fifth of female population meet the requirements. In the view of employees, it is not hard to quit the job and find another one due to the relatively low education background requirement. Therefore, the job duration in primary-secondary-education dominant industry is relatively short.⁵⁸

If the income discrimination against unmarried women is considered as employers' reaction to the potential loss in the future caused by pregnancy, the employers should expect to regain the payoff from employee in the future after pregnancy. That is, the longer period an employee spends in this company, the less reduction of salary should there be. For the industries with short job duration, the employers worry more about the employees' staying period.

The income discrimination can be considered as a cost transfer from employers to employees. It means the employers are intending to decrease the unmarried women's income on purpose to transfer employer's expected cost of pregnancy to the employees'

⁵⁶ Xuebing Qiao, Wenfan Yao, Dinghai Zhao. Research on the Relationship between Higher Education Structure, Graduates' Employment Structure and Industrial Structure [J]. Southeast University Journal, 2013, 4:030.

⁵⁷ See 2015 China Labor Statistical Yearbook, 3-3: Education Attainment of Female Employed Persons by Region

⁵⁸ Zhilei Shi, Yingmei Xu. Urban Women's Employment Mobility and Its Decision Mechanism [J]. Economics Commentary, 2010(4): 56-65

themselves.⁵⁹ If the employees are expected to stay for a short period, the employers are likely to reduce the salary of unmarried women more to offset the expected loss due to future pregnancy in case there is not enough time to recover the cost.

⁵⁹ Jia N, Dong X. Economic transition and the motherhood wage penalty in urban China: investigation using panel data [J]. Cambridge Journal of Economics

Chapter Three: Methodology

Data

The data used in this study is Chinese Household Income Project, Urban Household Survey (CHIP) in the year 2014. This survey includes both urban households and rural households. The reason that I ignored the data of rural households is because the employment situation in rural area is much more complicated. Part of them are self-employed, part of them are family business helpers and those who are seeking a job usually go out to urban districts. And we can see this situation through the survey questionnaire of rural households. Thus, the labor market in rural areas is not typical.

The data is actually revealing the situation in year 2013 but it is collected and organized in year 2014. The following table presents the summary of the key variables.

Table 3

Variable	Obs	Mean	Std. Dev.	Min	Max
single	4537	0.11	0.310	0	1
age	4537	39.27	9.248	16	68
working experience	4537	9.83	9.055	0	45
employed	4537	0.95	0.224	0	1
ln(income)	4128	7.74	0.745	1.39	11.92
Junior high school	4537	0.26	0.439	0	1
Senior high school	4537	0.18	0.382	0	1
specialized	4537	0.12	0.327	0	1
polytechnic college	4537	0.19	0.394	0	1
undergraduate	4537	0.17	0.377	0	1
graduate	4537	0.02	0.137	0	1

Table 4

Variable	Unmarried	Married
Age (mean)	26.22	32.248
Std.Dev.	3.133	4.035
Working experience(mean)	4.07	8.27
Std.Dev.	3.376	5.501
Employed(mean)	0.90	0.96
Std.Dev.	0.296	0.204
Income(mean)	2898.876	3035.7
Std.Dev.	2296.636	2200.976
ln(income)(mean)	7.75	7.813
Std.Dev.	0.737	0.682
Junior High School(mean)	0.09	0.20
Std.Dev.	0.292	0.398
Senior High School(mean)	0.09	0.14
Std.Dev.	0.282	0.351
Specialized(mean)	0.12	0.15
Std.Dev.	0.323	0.354
Polytechnic College(mean)	0.32	0.23
Std.Dev.	0.466	0.424
Undergraduate(mean)	0.31	0.23
Std.Dev.	0.476	0.420
Graduate(mean)	0.03	0.04
Std.Dev.	0.173	0.185

Hypothesis and Goals

The purpose of this paper is to analyze the employment rate gap and income gap between unmarried and married women. Furthermore, according to the previous discussion, the influence of education level is too important to ignore. There are seven education levels in total. The elementary school education level will be omitted in the models to prevent perfect collinearity.

Therefore, there should be two models to be discussed. One is the model used to estimate employment rate and the other is used to estimate income.

The Logistic Model

Since employment status is a dummy variable, the model I choose to describe employment rate is Logistic Model. Therefore, the dependent variable is employment status, it values one if this individual is currently employed, it values zero if the individual is currently unemployed. In order to compare the employment rate between unmarried and married women, the marital status is the one of the most important independent variable. Also, age should be considered as well because age is related to working experience and working experience is one important advantage during recruitment. Since different education level is tied to some specific industry category and the employment rate in different industry category is different, the education level should be included in the model. After including age and education level, the marital status should be further discussed by using interaction terms. With the interaction terms, we can figure out whether age or education level affect differently when the marital status varies.

One important thing that needs to be clarified is that the all the unmarried women who are older than 38 (38 not included) are all employed. This would cause a problem if I include the data of women who are older than 38-year. The ability to estimate a marginal effect of an additional year of age on employment rate is variation in the status at different ages. The fact that all unmarried women over 38 are employed means there is no variation there to exploit for estimation. Also, there is no observation of married women under age 22, therefore, the range of age should be 22 to 38.

The OLS Model

The OLS Model is used to estimate the relationship between income and potential related variables. The dependent variable is not simply the amount of monthly income, it

will be log-linearized. So the dependent variable in the models should be log (income). Therefore, the meaning of each regressor's coefficient is a little bit different. Assume the coefficient of a regressor is β , a change in the regressor by one unit is associated with a $100\beta\%$ change in monthly income.

The most important regressors are working experience and marital status. The working experience is measured by year and marital status is still a dummy variable. Also, the education level will be included to verify the effect of education level.

Also, there are very few observations of unmarried women who are older than 40. To avoid a bias result, the range of age is restricted from 22 to 40.

In order to choose the proper model, BIC value should be considered. The model with lower BIC value should be preferred. If the model with lower BIC value contains more variables, a reduction of 10 or more is necessary.

Results

Logistic Regression Model

The results of logistic regression model are shown in Table four. There are four models with different variables. The first one is the most basic model that only includes age as the independent variable. It shows that age reveals a significant effect.

The second model is based on the first one and it includes the marital status to verify the influence of being single. The marital status shows negative significant effect.

The third model is based on the second one. In the third model, a new interaction term is added:

single * age

This interaction term is used to verify whether age plays a different role between unmarried and married women. The coefficient of this interaction term shows significant effect and it is positive while the basic age term still does not show any significance. That implies the unmarried women can benefit from age increase. In other words, the unmarried women can eliminate part of the disadvantage by aging.

The fourth model includes the education level to see if education level plays an important role in the model. However, none of them shows significant effect which means education level does not matter in this topic.

The OLS Model

The OLS model results are shown in table five. There are four models in total. The first model is the basic one. The independent variables are marital status, age and working experience. The interaction term of marital status and working experience is also included to verify whether unmarried women's working experience play an different role. The result shows that the marital status does not have a significant effect on income, the unmarried women's working experience does not reveal a significant difference. Only the working experience shows significant effect.

The second model is based on the basic one and the only difference is the addition of quadratic form of working experience. To verify the effect of being unmarried, the following interaction term is also included:

$$single * working\ experience^2$$

The result shows that marital status, working experience, quadratic form of working experience and the interaction terms have significant effects except that the interaction term $single * working\ experience$ only shows significant effect at 10% level.

The third model is based on the first model with the accession of education level and interaction terms between marital status and education level:

$$single * education\ level$$

The result shows that all the new included variables have significant effect except for the education level of junior high school. Since the interaction terms show significance, the education level affect monthly income differently between married and unmarried women. But the interaction term *single * workexp* does not show significance which means unmarried women do not receive extra advantage or disadvantage from working experience while comparing with married women.

The fourth model is based on the second model and further includes education level and interaction terms. It shows that all the new variables show significance except for the education level of junior high school. Also, the quadric form of working experience is statistically significant and the interaction term *single * workexp²* is not significant which means the single women do not benefit extra from working experience.

The last row shows the BIC value of these four models. The third model has the lowest BIC value and it is much lesser than that in model one or model two which contain less variables. Therefore, it is worth adding these new variables in model.

Table 5 <div> Logistic Regression Results Employment Rate </div>				
Variable	Logit 1	Logit 2	Logit 3	Logit 4
age	0.09** (0.026)	0.08** (0.030)	0.03 (0.034)	0.03 (0.034)
single		-0.32** (0.265)	-8.53*** (2.799)	-8.06** (5.130)
single*age			0.31** (0.109)	0.29** (0.107)
junior				-0.86 (1.050)
senior				0.14 (1.097)
specialized				-1.11 (1.048)
polytechnic				-0.25 (1.049)
undergraduate				0.51 (1.071)
graduate				-0.55 (1.190)
constant	0.05 (0.764)	0.70 (0.945)	2.03 (1.076)	2.45* (1.468)
Pseudo R ²	0.0183	0.0202	0.0341	0.0715

*Significant at 10% level

**Significant at 5% level

***Significant at 1% level

<div> Table 6 <div> OLS Model Log Income </div> </div>				
Variable	OLS 1	OLS 2	OLS 3	OLS 4
single	0.033 (0.046)	0.179*** (0.072)	-0.364*** (0.083)	-0.313*** (0.105)
age	0.003 (0.006)	0.004 (0.005)	0.005 (0.006)	0.004 (0.005)
workexp	0.018*** (0.002)	0.059*** (0.008)	0.009*** (0.002)	0.026*** (0.007)
single*workexp	0.001 (0.007)	-0.045* (0.024)	0.008 (0.008)	-0.020 (0.023)
workexp^2		-0.002*** (0.000)		-0.001** (0.000)
single*workexp^2		0.002** (0.001)		0.001 (0.001)
junior			0.000 (0.081)	0.001 (0.081)
senior			0.161* (0.082)	0.159* (0.082)
specialized			0.169** (0.082)	0.164** (0.082)
polytechnic			0.342*** (0.080)	0.335*** (0.081)
undergraduate			0.608*** (0.080)	0.594*** (0.082)
graduate			0.933*** (0.106)	0.919*** (0.107)
single*junior			0.230** (0.109)	0.220** (0.109)
single*senior			0.251** (0.119)	0.243** (0.120)
single*specialized			0.257** (0.101)	0.253** (0.103)
single*polytechnic			0.310*** (0.093)	0.310*** (0.095)
single*undergraduate			0.318*** (0.094)	0.323*** (0.096)
single*graduate			0.351** (0.165)	0.361** (0.167)
constant	7.702*** (0.025)	7.574*** (0.034)	7.310*** (0.116)	7.244*** (0.119)
BIC	3418.627	3401.058	3023.755	3032.698

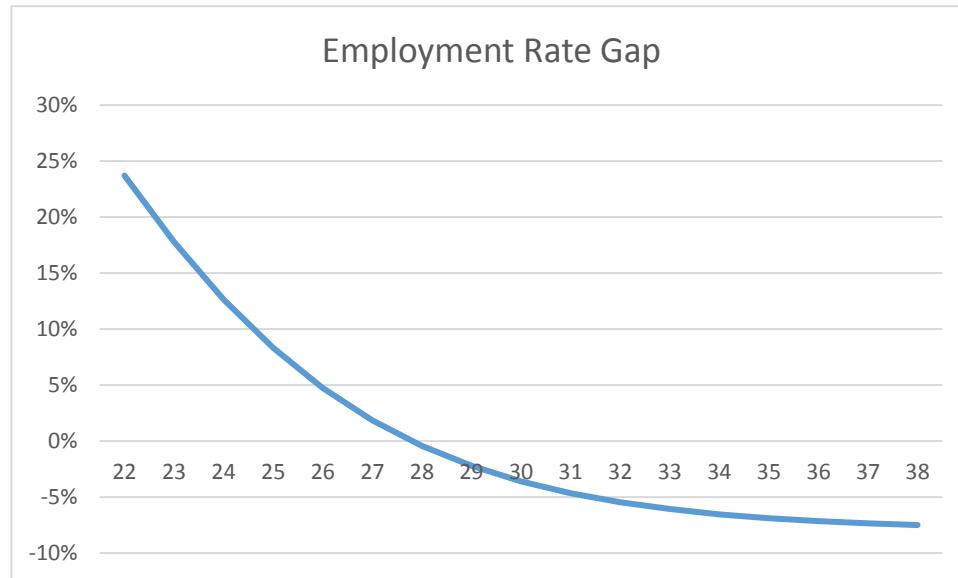
Discussion

Employment Rate Gap

According to the results in logistic model, the marital status and unmarried women's age show significant effect, married women's age and education level do not show any significance. Let's take the fourth model to estimate the employment rate gap. Let the employment rate gap be the difference between married women's employment rate and unmarried women's employment rate.

$$\begin{aligned}\text{Married women's employment rate: } R_{\text{married}} &= \frac{1}{1 + e^{-2.45}} \\ \text{Unmarried women's employment rate: } R_{\text{unmarried}} &= \frac{1}{1 + e^{-(5.61 + 0.29 \cdot \text{age})}} \\ \text{Employment rate gap: } \Delta R &= \frac{1}{1 + e^{-2.45}} - \frac{1}{1 + e^{-(5.61 + 0.29 \cdot \text{age})}}\end{aligned}$$

Figure 17



As shown in figure 6, the employment rate gap is decreasing as age increases. From age 22 to age 28, the employment rate gap is a positive decreasing function. It means

married women have an advantage of employment rate during this period and this advantage is vanishing. At the age 28, the employment rate gap is almost zero which means the employment rate of married woman is no longer larger than that of unmarried woman's. After age 28, the employment rate gap is still decreasing but its value becomes negative. I believe the fundamental reason is the change of marriage trend through age. Figure 5 has shown the proportion of unmarried women by the end of 2015.

The function of proportion of single women is a decreasing function. Since the independent variable is age, the proportion of single women is decreasing along the time. After the age 29, the proportion is less than 20%⁶⁰, after age 35, the proportion is less than 5% and the function becomes nearly flat.

Even we are sure about the function being decreasing, we cannot tell how fast it decrease from figure 5. If we want to figure out the annual change of the proportion, we need focus on figure 6.

Figure 6 shows how the proportion change vary through time. Each value of a certain point represents the difference between the proportion of unmarried women at current age and the proportion at previous age. Therefore, the value of -4.4% of the first point means the proportion of unmarried women decreases by 4.4% at age 21 comparing with the proportion at age 20. With this figure, we can speculate the trend of getting married. From the age 21 to age 24, the function is increasing. This means the trend of getting married is increasing. At the age 24 to 27, the function remains around -10.5% to -11% level. During this period, the trend of getting married is holding still but also remains the highest level

⁶⁰ To be precise, the proportion at the age 28 is 18.5%.

among all ages. From age 28, the function decreases significantly which means the trend of getting married is decreasing.

In the view of derivative, the graph in figure 6 can be considered as the derivative of the function in figure 5. The derivative function is decreasing from age 21 to age 24, it is holding still from age 24 to age 28 and it is increasing from age 28. This means, the second derivative is negative from age 21 to age 24, it is zero from age 24 to age 28 and it is positive from age 28. Therefore, the original function of female in figure 5 is concave from age 21 to age 24 and it is convex from age 28. The concave part of the function in figure 5 means the population of unmarried women is decreasing faster and faster. The convex part of the function in figure 5 means the population of unmarried women is decreasing slower and slower. In other words, the unmarried women from 21-year old to 24-year are having increasing trend to become married, those who are older than 27-year old are having decreasing trend to become married.

Since the single status is an important factor that employers are focusing on, the employers are tending to decrease the discrimination against single women if the women's trend of getting married are expected to decrease. If the unmarried employee is hired at the age of 21, the employee is facing an increasing risk of loss due to increasing probability of single employee getting married. If the unmarried employee is hired at age of 28, the employee is facing a decreasing risk of loss.

As I discussed before, single women have both advantage and disadvantage comparing with married women. The disadvantage is that employers have to bear the risk of possible loss due to maternity leave in the future if they hire a single woman which is additional cost for employers. The advantage of unmarried women is that they are more

flexible with time arrangement or overtime work, so they can concentrate more on working. Therefore, when the employer is weighing the advantage and disadvantage of an unmarried woman, age is playing an important role here. Let's assume the unmarried women's advantage is remaining unchanged through age. The risk of loss begin to decrease from age 28. The possible explanation of the phenomenon that the employment rate gap reaches zero at age 28 is because the disadvantage of being unmarried at this age is no longer larger than the advantage of being unmarried. In other words, the loss that employers face is indifferent from the benefit of hiring an unmarried woman at age 28. Following this idea, we can expect that unmarried women are having a higher employment rate after age 28 because the loss that employers face is decreasing while the advantage remains still.

Income Gap

According to the third model, women with different education degree have different functions. For the married women, the estimated functions are shown in the following table

Table 7 Estimated Functions for Married Women	
Elementary or Junior	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.31$
Senior	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.471$
Specialized	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.479$
Polytechnic	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.652$
Undergraduate	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.918$
Graduate	$\ln(\text{income}) = 0.009 * \text{workexp} + 8.243$

For the unmarried women, the estimated functions are shown in the following table:

Table 8	Estimated Functions for Unmarried Women
Elementary	$\ln(\text{income}) = 0.009 * \text{workexp} + 6.946$
Junior	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.176$
Senior	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.268$
Specialized	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.372$
Polytechnic	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.598$
Undergraduate	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.872$
Graduate	$\ln(\text{income}) = 0.009 * \text{workexp} + 8.230$

The coefficient of the dummy variable “single” is -0.364. This means the unmarried women have a lower income in general. Since the dependent variable is $\ln(\text{income})$, this means the income will decrease by 36.4% if the dummy variable increases by one unit which is switching from married to unmarried.

The coefficient of working experience is 0.009. This means the working experience has a positive effect on income. To be precise, every one additional year of working experience leads to 0.9% increase of income.

The coefficient of the interaction *single * workexp* is not significant. This means the unmarried women do not benefit differently from accumulation of working experience while comparing with married women.

The coefficient of each education level is positively significant except for the junior school degree and the coefficient is becoming larger if the education level is getting higher. This means higher education level can provide a better income. With a senior high school

degree, the income will increase by 16.1%. With a specialized secondary and technical school degree, the income will increase by 16.9%. With a polytechnic college degree, the income will increase by 34.2%. With an undergraduate degree, the income will increase by 60.8%. With a graduate degree, the income will increase by 93.3%.

The coefficient of the interaction terms are listed as

Table 9	Coefficients of Interaction Terms
single*junior	0.230**
single*senior	0.251**
single*specialized	0.257**
single*polytechnic	0.310***
single*undergraduate	0.318***
single*graduate	0.351**

This is the one of the most fundamental parts in this model because what I care about is whether education level affect single women's income differently from married women's. According to the data, the single women with a junior high school degree will have 23% increase of income. The single women with a senior high school degree will have 25.1% increase of income. The single women with a specialized secondary and technical school degree will have 25.7% increase of income. The single women with a polytechnic college degree will have 31% increase of income. The single women with an undergraduate degree will have 31.8% increase of income. The single women with a graduate degree will have 35.1% increase of income. Comparing with the 39.4% decrease of income of being unmarried, this increase can be considered as a compensation effect. The compensation

effect that comes with secondary education rank are 23%, 25.1% and 25.7% income increase. The compensation effect that comes with higher education rank are 31%, 31.8% and 35.1% income increase.

Since the coefficients of single women with higher education rank are all over 0.3 and the difference between these coefficients with the coefficient of being single is not larger enough, a hypothesis that $\beta_{single} + \beta_{single*education} = 0$ should be tested and the results are presented in the following table.

Table 10

Hypothesis	$\beta_{single} + \beta_{single*education} = 0$					
Education	Junior	Senior	Specialized	Polytechnic	Undergraduate	Graduate
Prob>F	0.0580	0.0581	0.0583	0.1933	0.2708	0.8346

The results show that the hypothesis of the first three education levels can be rejected at 10% and the hypothesis of the rest three education levels cannot be rejected. This means among the women with secondary education rank, single women have a significant income decrease. However, among the women with higher education rank, there is no significant income difference between single and married women.

It is not a coincidence that the compensation effect is divided into two parts. One explanation is the employed category that makes this difference. As I discussed before in chapter three, the education rank is highly related to the industry category. The occupations that secondary education graduates have are both labor-intensive and high job mobility. Women who are employed in these categories are more likely to face discrimination.

I believe the discrimination that causes income gap is due to two effects, the basic discrimination effect and the compensation effect, the first one is a negative effect and the latter one is positive. The discrimination effect is measured by the coefficient of dummy variable. The compensation effect is measured by the coefficient of the interaction terms. As the result shown, the compensation effect of women with secondary education rank degree is less than that of women with higher education rank degree. In other words, unmarried women benefit differently from education degree. To be precise, the compensation effect of women with secondary education rank degree is not large enough to overcome the discrimination effect. But the compensation effect of women with higher education rank degree is large enough to overcome the discrimination effect so that income difference between unmarried and married is not significant in this case.

Limitations of the Models

Since the CHIP data is collected randomly and it is not follow-up data, I cannot use the data to estimate a panel data model. The data I use is collected in year 2013 and it is cross-sectional, therefore, the previous causal shouldn't be claimed this easily.

The newest CHIP data is collected in 2013 and the one-child policy has been replaced by two-child policy since 2016. I do not have the employment data after the new policy, so I cannot verify how the new policy affects unmarried women, even the women who have already had a child.

Chapter Four: Conclusion

Due to the high correlation between marriage and child birth, the marital status probably reveals the fertility status. Since employers are paying full amount of salary to pregnant female, the pregnancy and maternity leave of female employees become extra cost to employers. But unmarried women have their own advantages that they have more flexible time. The employers tend to weigh the disadvantages and advantage to determine whether they should hire unmarried women.

According to the econometric model, the employment rate gap and income gap are estimated. The results show that the employment rate gap exists between unmarried and married women, in other words, the same qualified unmarried women are facing a lower employment rate when they are younger than 28. When women are older than 28, the unmarried women are having an advantage in employment rate because the risk to employers are expected to decrease. Also, the education level does not play a role in employment rate. It reveals that single women do not benefit or forfeit with the education experience. The result also shows the existence of income gap which unmarried women are having lower income generally. In the case of unmarried women, there are two effect, a positive complementary effect and a negative discrimination effect. The positive effect results from education level. The unmarried women with higher education benefit more

than those with secondary education on average. The negative discrimination effect is due to remaining unmarried. The hypothesis test shows that there is no significant difference between the discrimination effect and complementary effect for unmarried women with higher education rank degree. For them, being educated is enough to overcome the discrimination of being single. But for the women with secondary rank degree, their education backgrounds are not sufficient enough to eliminate the discrimination.

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Appendix

Figure 1

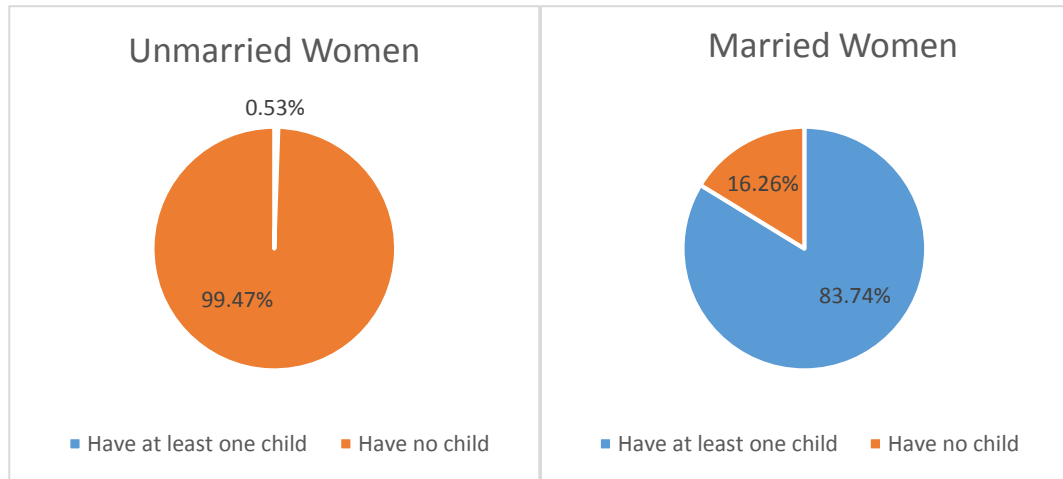


Figure 2

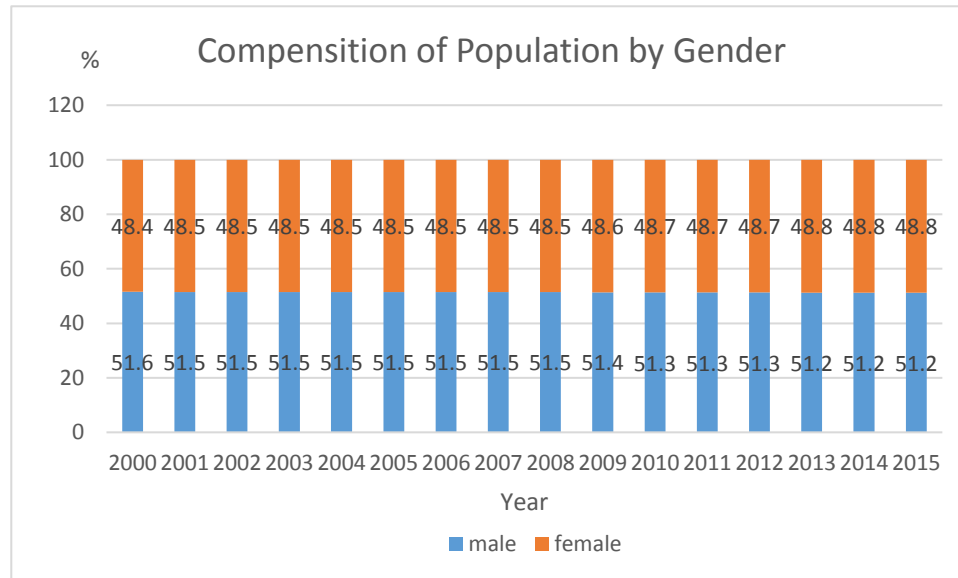


Figure 3:

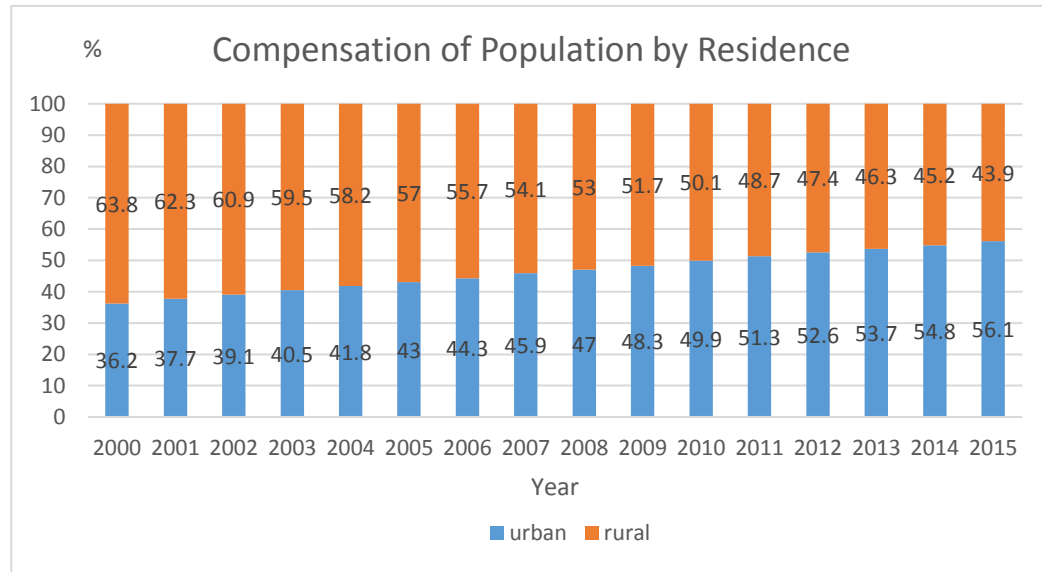


Figure 4

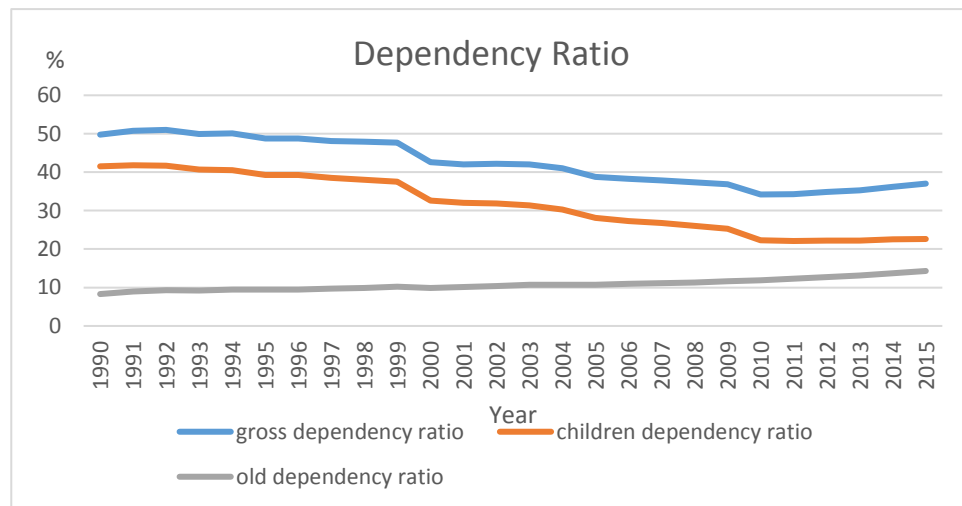


Figure 5:

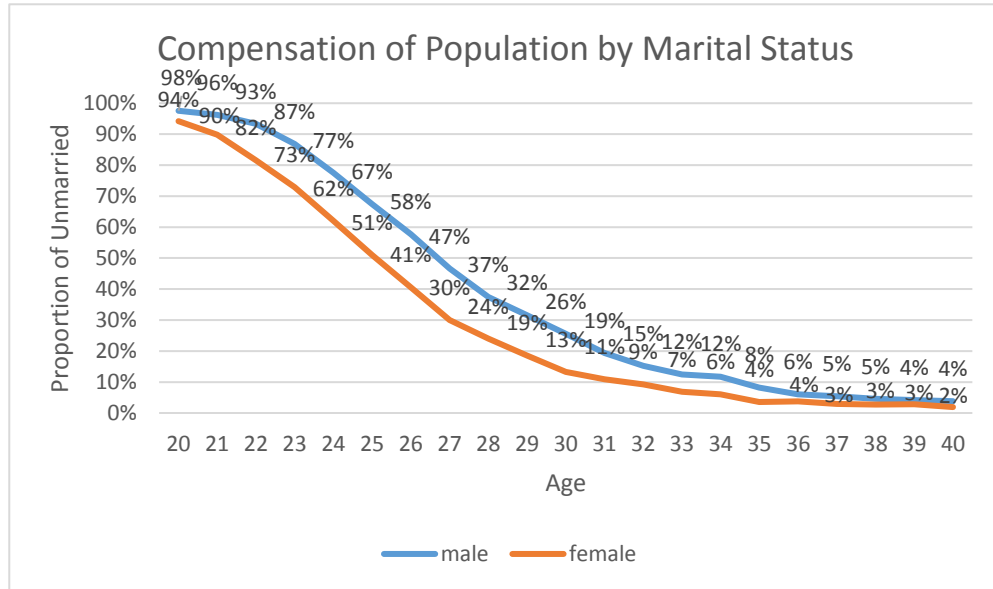


Figure 6:

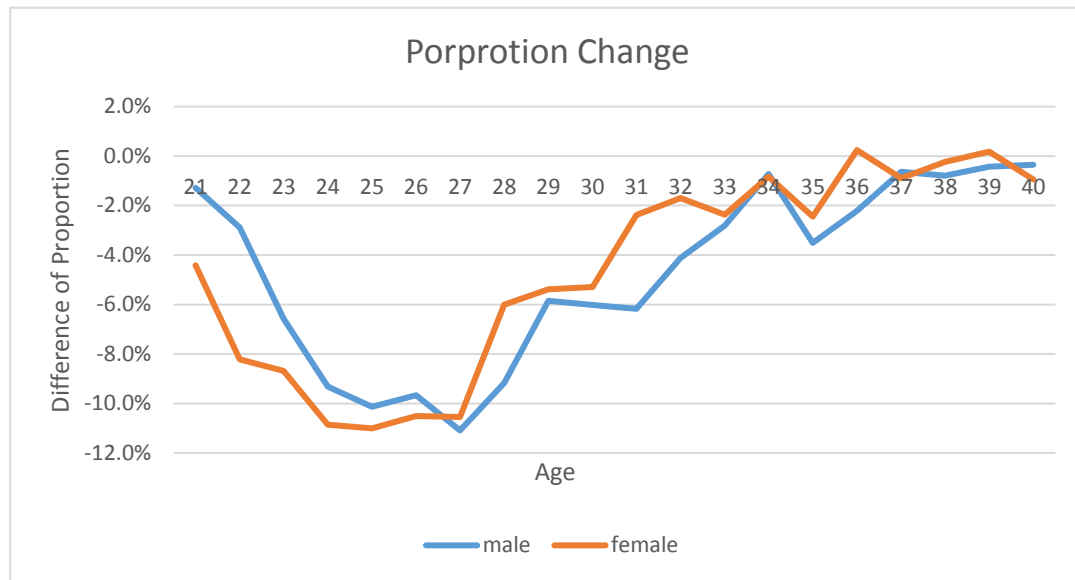


Figure 7

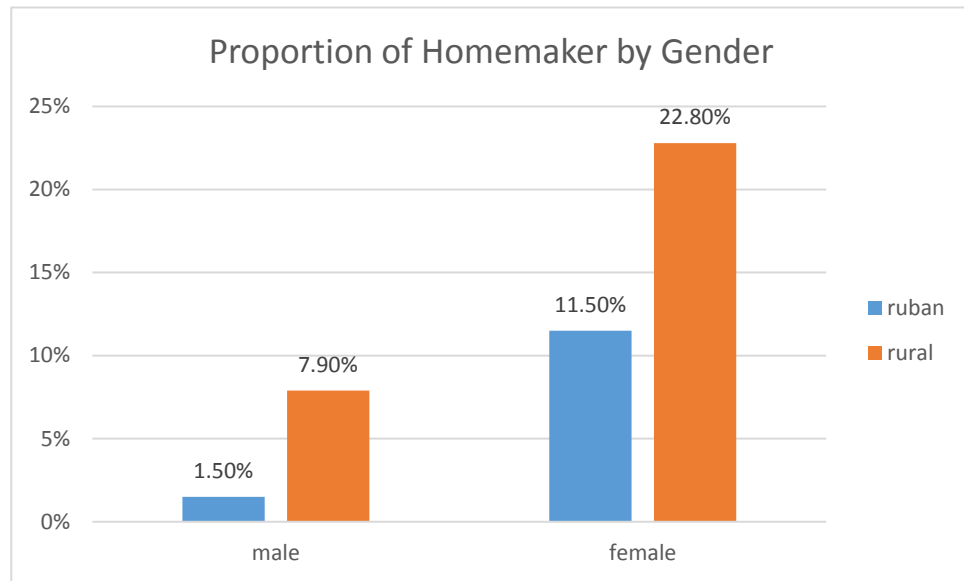


Figure 8

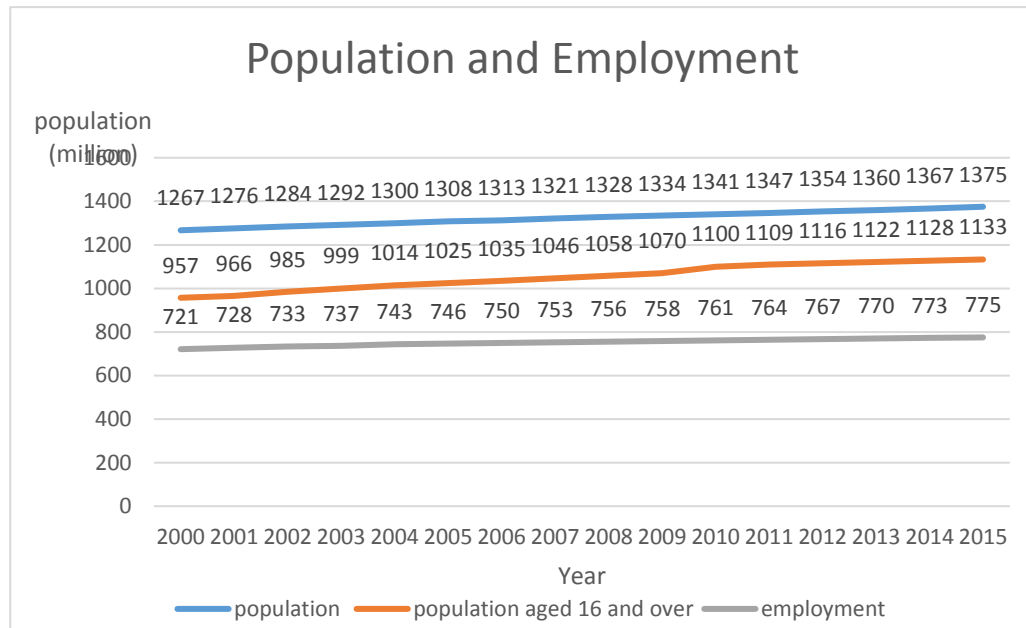


Figure 9

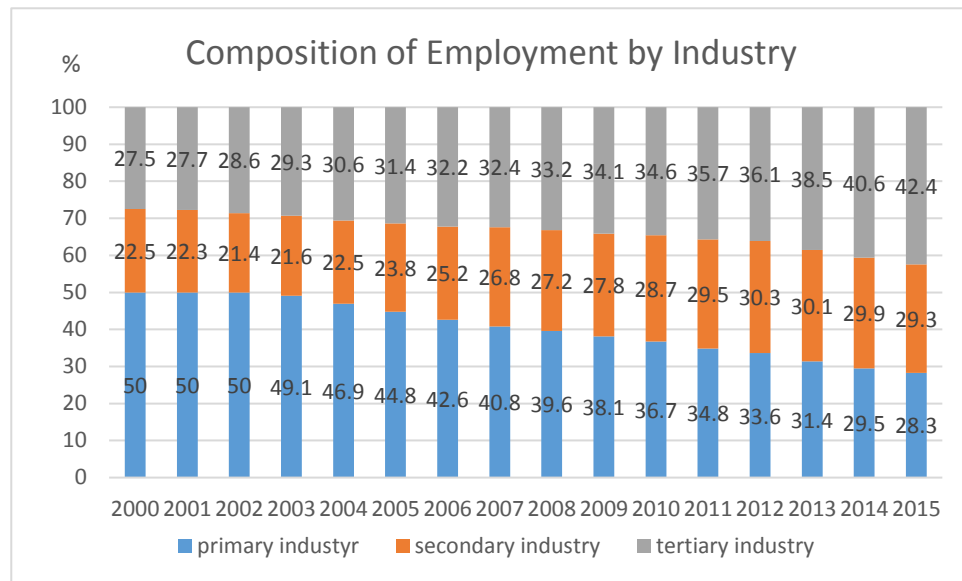


Figure 10

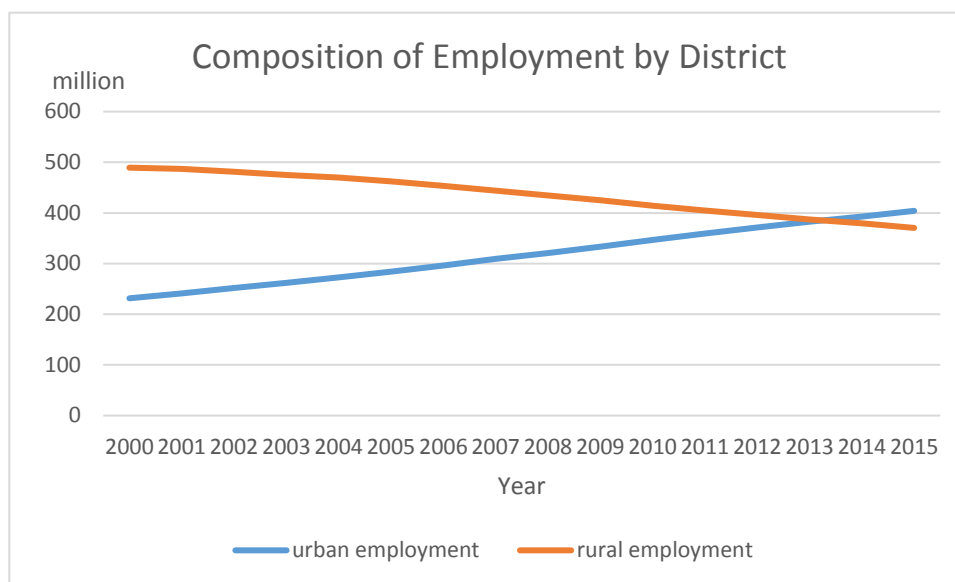


Figure 11

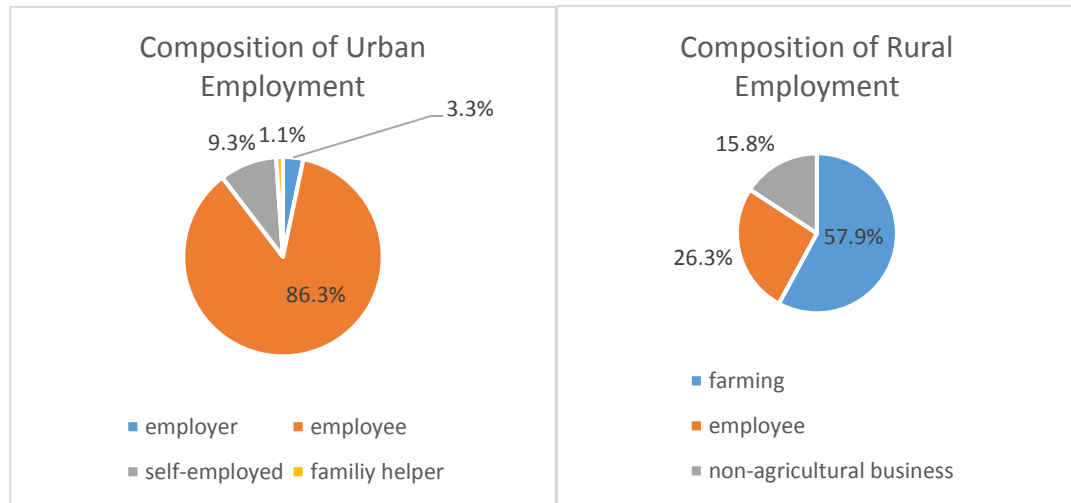


Figure 12

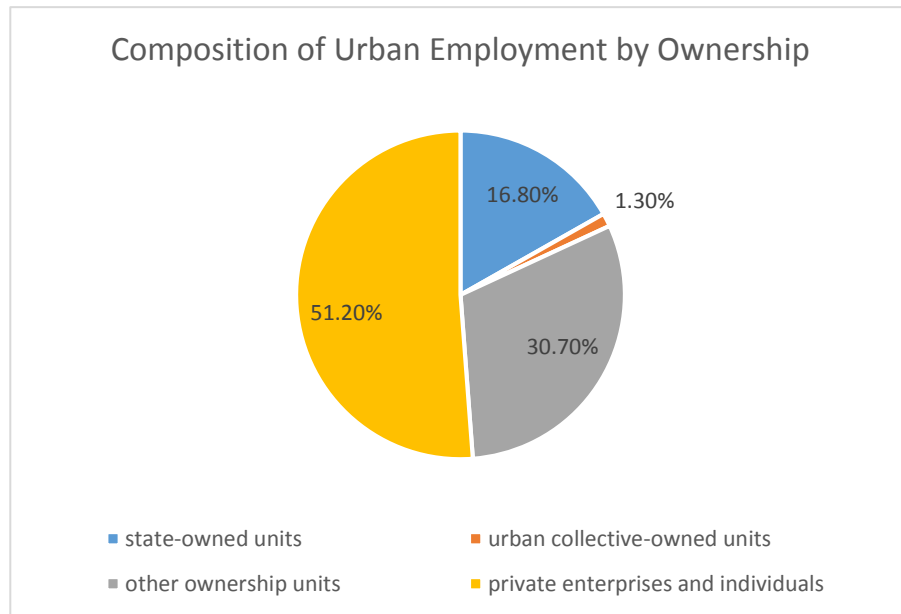


Figure 13

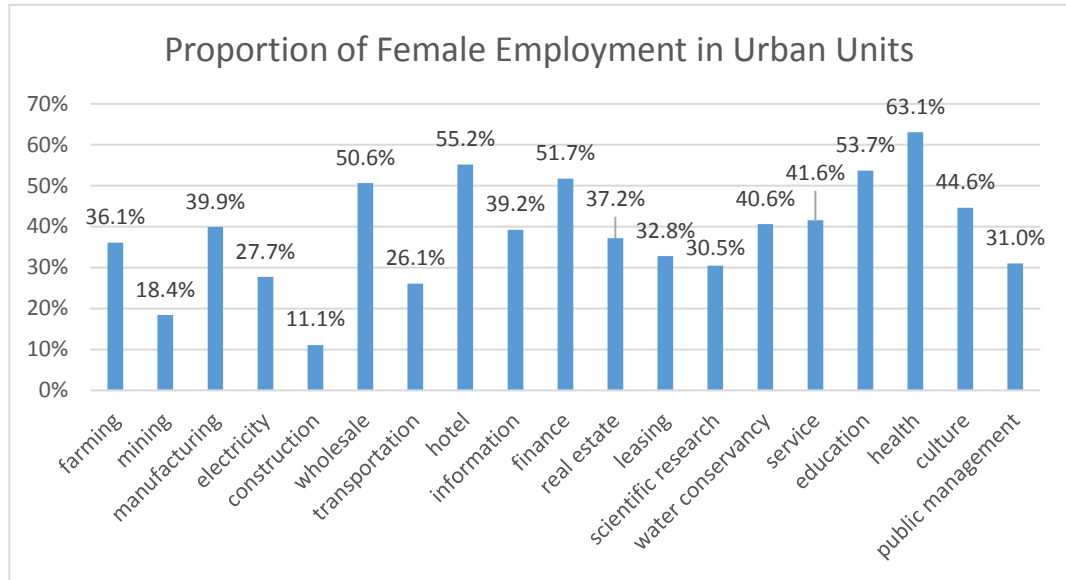


Table 1

Compulsory	Duration	Optional	Duration
Pre-maternity leave	1 hour per day for 2 months	Optional pre-maternity leave	2 and half months
Breastfeeding time	1 hour per day until baby one-year-old	Breastfeeding leave	6 and half months
Maternity leave	98 days	Protection leave	Depends

Figure 14

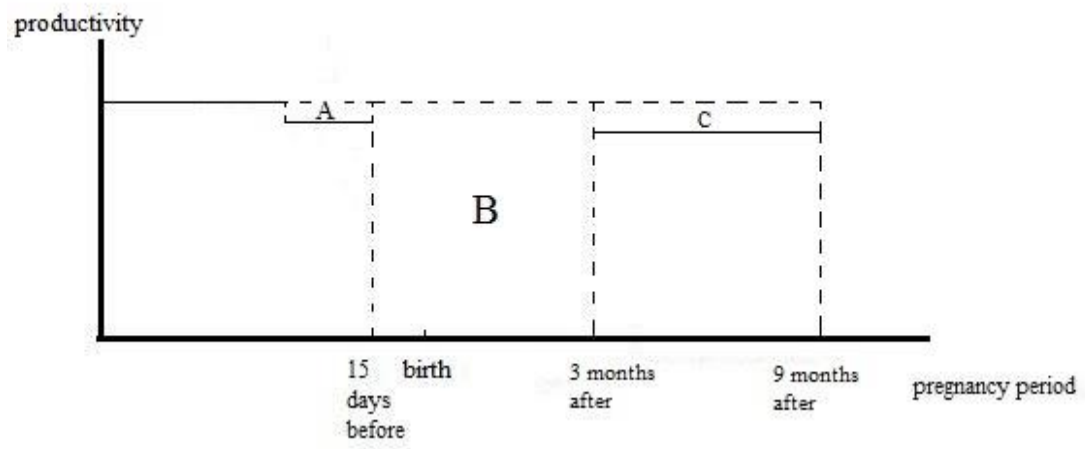


Figure 15

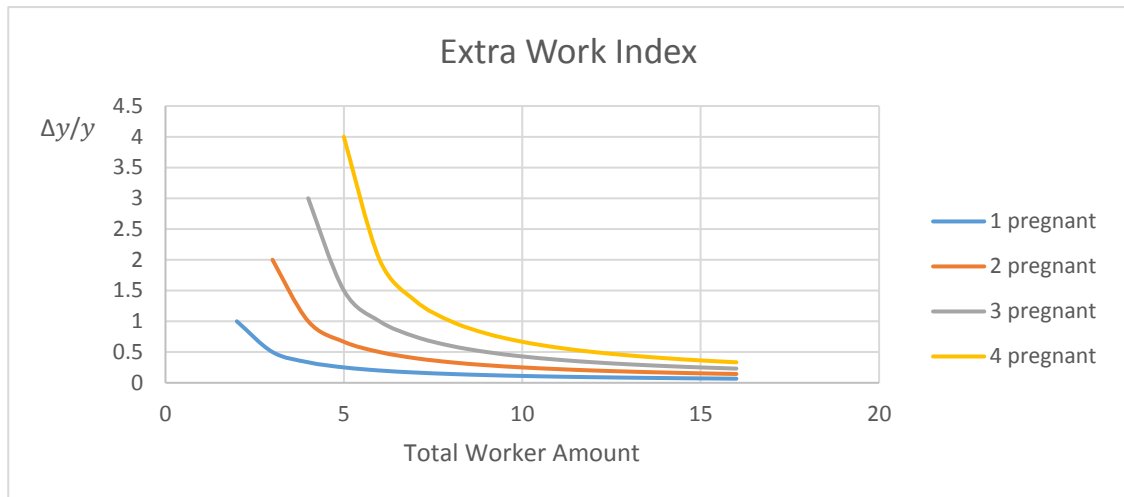


Figure 16

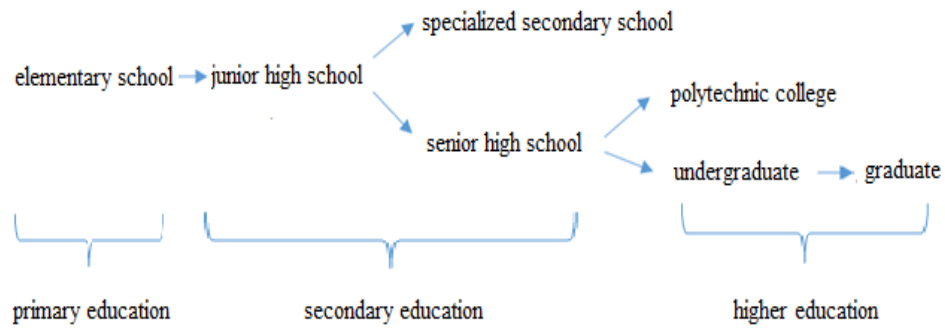


Table 2**Urban Employed Female Classified by Education Level and Industry (%)**

Education level	Farming, Forestry, Animal Husbandry and Fishery	Mining	Manufacturing	Production and Supply of Electricity, Heat, Gas and Water	Construction	Whole Sale and Retail Trades
Elementary	45.6	0.3	16.7	0.1	3.2	14.9
Junior	19.3	0.4	25.9	0.4	2.5	25.3
Senior	3.9	1.1	21.5	1.5	1.9	32.1
Polytechnic	0.9	0.7	15.5	2.2	2.4	18.8
Undergraduate	0.5	0.5	10.1	1.7	2.1	9.3
Graduate	0.1	0.4	6.9	0.8	0.7	4.3
Scientific Research and Technical Service	Management of Water Conservancy, Environment and Public Establishment	Services to Households, Repair and Other Services	Education	Health and Social Service	Culture Sports and Entertainment	Public Management, Social Security and Social Organization
0.1	0.7	4.8	0.7	0.6	0.6	0.9
0.2	0.6	5.5	1.5	1.0	0.8	1.2
0.6	0.7	4.7	3.9	3.9	1.2	4.1
1.4	0.9	2.7	10.7	10.9	2.3	9.4
2.1	1.1	1.2	21.4	11.2	3.1	13.4
6.7	0.8	0.5	32.8	12.5	3.7	10.8
Transport, Storage and Post	Hotels and Catering Service	Information Transmission, Software and Information Technology	Finance Intermediation	Real Estate	Leasing and Business Services	
1.1	6.4	1.1	0.6	1.0	0.6	
1.9	8.4	2.1	0.9	1.0	1.0	
3.2	6.3	3.4	2.4	1.7	1.9	
3.5	3.1	4.1	5.1	2.2	3.1	
2.7	1.4	4.6	7.9	1.7	3.9	
1.3	0.4	4.8	8.2	0.8	3.4	

Table 3

Variable	Obs	Mean	Std. Dev.	Min	Max
single	4537	0.11	0.310	0	1
age	4537	39.27	9.248	16	68
working experience	4537	9.83	9.055	0	45
employed	4537	0.95	0.224	0	1
ln(income)	4128	7.74	0.745	1.39	11.92
Junior high school	4537	0.26	0.439	0	1
Senior high school	4537	0.18	0.382	0	1
specialized	4537	0.12	0.327	0	1
polytechnic college	4537	0.19	0.394	0	1
undergraduate	4537	0.17	0.377	0	1
graduate	4537	0.02	0.137	0	1

Table 4

Variable	Unmarried	Married
Age (mean)	26.22	32.248
Std.Dev.	3.133	4.035
Working experience(mean)	4.07	8.27
Std.Dev.	3.376	5.501
Employed(mean)	0.90	0.96
Std.Dev.	0.296	0.204
Income(mean)	2898.876	3035.7
Std.Dev.	2296.636	2200.976
ln(income)(mean)	7.75	7.813
Std.Dev.	0.737	0.682
Junior High School(mean)	0.09	0.20
Std.Dev.	0.292	0.398
Senior High School(mean)	0.09	0.14
Std.Dev.	0.282	0.351
Specialized(mean)	0.12	0.15
Std.Dev.	0.323	0.354
Polytechnic College(mean)	0.32	0.23
Std.Dev.	0.466	0.424
Undergraduate(mean)	0.31	0.23
Std.Dev.	0.476	0.420
Graduate(mean)	0.03	0.04
Std.Dev.	0.173	0.185

Table 5 <div> <div>Logistic Regression Results</div> <div>Employment Rate</div> </div>				
Variable	Logit 1	Logit 2	Logit 3	Logit 4
age	0.09** (0.026)	0.08** (0.030)	0.03 (0.034)	0.03 (0.034)
single		-0.32** (0.265)	-8.53*** (2.799)	-8.06** (5.130)
single*age			0.31** (0.109)	0.29** (0.107)
junior				-0.86 (1.050)
senior				0.14 (1.097)
specialized				-1.11 (1.048)
polytechnic				-0.25 (1.049)
undergraduate				0.51 (1.071)
graduate				-0.55 (1.190)
constant	0.05 (0.764)	0.70 (0.945)	2.03 (1.076)	2.45* (1.468)
Pseudo R ²	0.0183	0.0202	0.0341	0.0715

<div> Table 6 <div> OLS Model Log Income </div> </div>				
Variable	OLS 1	OLS 2	OLS 3	OLS 4
single	0.033 (0.046)	0.179*** (0.072)	-0.364*** (0.083)	-0.313*** (0.105)
age	0.003 (0.006)	0.004 (0.005)	0.005 (0.006)	0.004 (0.005)
workexp	0.018*** (0.002)	0.059*** (0.008)	0.009*** (0.002)	0.026*** (0.007)
single*workexp	0.001 (0.007)	-0.045* (0.024)	0.008 (0.008)	-0.020 (0.023)
workexp^2		-0.002*** (0.000)		-0.001** (0.000)
single*workexp^2		0.002** (0.001)		0.001 (0.001)
junior			0.000 (0.081)	0.001 (0.081)
senior			0.161* (0.082)	0.159* (0.082)
specialized			0.169** (0.082)	0.164** (0.082)
polytechnic			0.342*** (0.080)	0.335*** (0.081)
undergraduate			0.608*** (0.080)	0.594*** (0.082)
graduate			0.933*** (0.106)	0.919*** (0.107)
single*junior			0.230** (0.109)	0.220** (0.109)
single*senior			0.251** (0.119)	0.243** (0.120)
single*specialized			0.257** (0.101)	0.253** (0.103)
single*polytechnic			0.310*** (0.093)	0.310*** (0.095)
single*undergraduate			0.318*** (0.094)	0.323*** (0.096)
single*graduate			0.351** (0.165)	0.361** (0.167)
constant	7.702*** (0.025)	7.574*** (0.034)	7.310*** (0.116)	7.244*** (0.119)
BIC	3418.627	3401.058	3023.755	3032.698

Figure 17

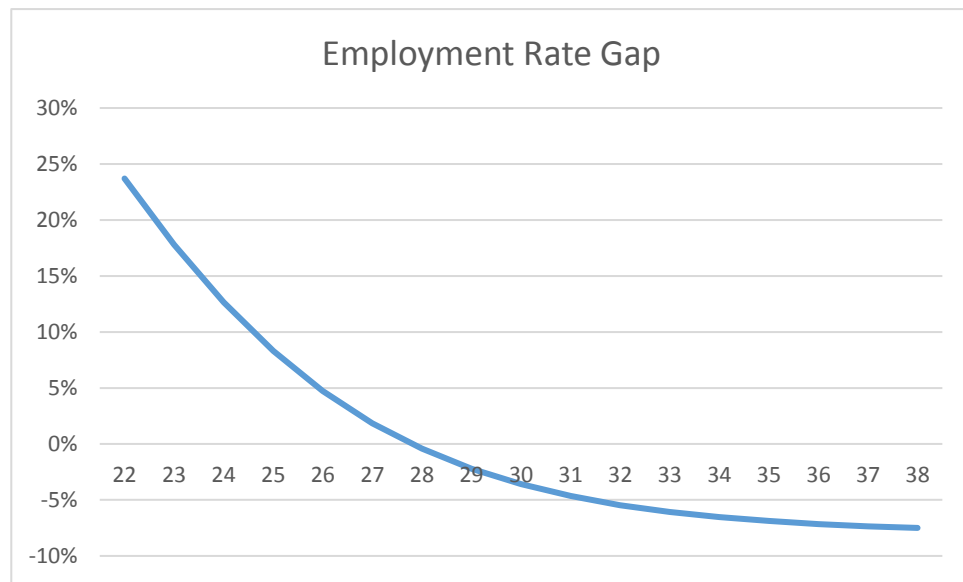


Table 7 Estimated Functions for Married Women	
Elementary or Junior	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.31$
Senior	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.471$
Specialized	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.479$
Polytechnic	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.652$
Undergraduate	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.918$
Graduate	$\ln(\text{income}) = 0.009 * \text{workexp} + 8.243$

Table 8 Estimated Functions for Unmarried Women	
Elementary	$\ln(\text{income}) = 0.009 * \text{workexp} + 6.946$
Junior	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.176$
Senior	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.268$
Specialized	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.372$
Polytechnic	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.598$
Undergraduate	$\ln(\text{income}) = 0.009 * \text{workexp} + 7.872$
Graduate	$\ln(\text{income}) = 0.009 * \text{workexp} + 8.230$

Table 9	Coefficients of Interaction Terms
single*junior	0.230**
single*senior	0.251**
single*specialized	0.257**
single*polytechnic	0.310***
single*undergraduate	0.318***
single*graduate	0.351**

Table 10

Hypothesis	$\beta_{single} + \beta_{single*education} = 0$					
Education	Junior	Senior	Specialized	Polytechnic	Undergraduate	Graduate
Prob>F	0.0580	0.0581	0.0583	0.1933	0.2708	0.8346