Grey-Correlative-Degree Analysis of Influencing Factors of Women's Employment in China

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Abstract

Since the reform in transitional economies, the status of women has deteriorated relative to that of men, both in terms of income and employment. Many social and economic factors influence women's employment. Based on gray system theory, this paper makes grey-correlative-degree analysis of influencing factors of women's employment in order to reveal the main influencing factors. According to the grey-correlative-degree, factors influencing women employment during transition ranks as following: human capital investment, average size of household, wage level, development of tertiary industry and state of matrimony. This paper gives some policy advices based on the result, such as raising the level of women human capital investment, promoting housework socialization, protecting labor income right of women by legal means, and developing the tertiary industry to supply more jobs for women.

Key words: Women's employment; Influencing factors; Grey-correlative-Degree analysis

INTRODUCTION

After the foundation of the New China, China's female labor force participation rate (FLFPR) exceeded other countries and areas a lot (Zhang, 2002). But since the reform and opening to the outside world, controlling for the effects of the wider definition of employment in 1990, the FLFPR in China has fallen gradually, and the status of women has deteriorated relative to that of men both in terms of income and employment in the economic transition (Li & Gustafsson, 1999). Generally speaking, gender difference in China was narrowed by the government before the reform, which was more or less responsible for the decline in the position of women in employment and income.

China's employment regime is conducted into a market track during transition from planed economy to market economy. In this process, enterprises have a big say in employment, which influence female workers used to be under protection of employment policy in planed economy. Women's employment condition has changed a lot. Women's employment is a complicated social and economic problem. Women's employment is not only influenced by labor demand, such as knowledge, skill, experience and discrimination, but also influenced by labor supply that is relevant to women themselves, and labor supply will influence labor demand too. In market economy, enterprises will measure the cost and benefit of using female labor under the rule of maximum of profit. Because of physiologic and social factors, married women may cause losses to enterprises by reason of housework, pregnancy, childbearing and lactation. In this condition, enterprises always reduce female labor demand. Based on mechanism of grey-correlative-degree analysis, this paper chooses some factors influencing women employment and studies influencing degree of these factors. Based on which this paper gives some policy advices to promote women employment and construct harmonious labor market.

1. THEORETICAL ANALYSIS OF INFLUENCING FACTORS OF WOMEN'S EMPLOYMENT AND EXPLANATION ON MEASURING INDICATOR OF RELATED INFLUENCING FACTORS

There are many factors influencing women's employment, which can be divided into qualitative and quantitative aspects. In qualitative aspects, social prejudice, protection of law on women's employment, condition of household, physical conditions of women, the state of matrimony, conditions of jobs suitable for women, the time women spend on housework, human capital investment of women, and so no will influence women's employment. In quantitative aspects, wage, number of household members especially number of minor children, wage of other household members, family's income not from work, age and so on will influence women's employment too. This paper chooses the ratio of women's employment figures in urban enterprises to total employment figures in urban enterprises reflecting women's employment conditions, denoted as X_0. To meet the demands of empirical analysis and data acquired, this paper chooses some influencing factors and their measuring indicators as follows.

1.1 Wage

According to traditional labor economic theory, when someone makes decision on labor supply, the essence is choosing to spend time on earning or leisure. Wage can be seen as the opportunity cost of leisure. When wage is increased, people will reduce the consumption of leisure to increase working hours because the relative price of leisure is increased. This is the substitution effect. But raising wage will increase income, and people can increase the consumption of leisure. That is the income effect. Wage level will influence all labor supply including women's labor supply. This paper chooses indices of real average wage of staff and workers (X_1) reflecting wage level to analyze how wage influence women's employment.

1.2 Conditions of Jobs

It was generally acknowledged that there are many jobs in tertiary industry suitable for women and the development of tertiary industry will influence women's labor supply. During the process of post industrialization in USA, the number of employment opportunities created by tertiary industry is more than the number reduced in traditional industry. Some countries such as Canada and Switzerland attach great importance to the development of tertiary industry, and it has positive influences on women's employment (Hill,M.A, 1983). In recent years, along with the industrial structure adjustment, tertiary industry is becoming the main channel absorbing female labor force. More and more women work in hi-tech industry such as computer, software, communication and financial industry, and they have been an important force in the development of industry. This paper chooses the ratio of employment figures in tertiary industry to total employment figures(X_2) reflecting the condition of tertiary industry absorbing female labor force to analyze how conditions of jobs suitable for women influence women's employment.

1.3 Human Capital Investments

According to modern human capital theory, education is an important method to invest in human capital. Sexual discrimination has a great negative impact on human capital investments of women, because parent as investment subject often prefer sons as the subject of human capital investment. Although this kind of condition showed a turn after the foundation of New China, human capital investment level of women is still lower than men. According to Guo (2006), the ratio of female students to all students is lower or much lower than 50% in various stages of education including primary, secondary, tertiary and postgraduate education. This paper chooses the ratio of female students to all students in tertiary education (X_3) reflecting the education condition of women to analyze how human capital investment influence women's employment.

1.4 Housework

Housework will have negative effects on labor supply of family members. Women will spend more time on housework because of traditional division of labor between females and males, which will influence women's employment directly (Gary Becker, 1965). To married women, they have to spend a lot of time on bringing up children, so they often choose to reduce labor supply at a particular time (especially when children are young) and withdraw from the labor market. At the same time, number of household members will influence female labor supply too. This paper chooses the average size of household in city (X_4) reflecting the burden of housework to analyze how housework influence women's employment.

1.5 State of Matrimony

Traditional family decision model assumes an effect function of common preference, and rational family will divide the work according to comparative advantage to achieve maximum effect. In recent years, empirical research show many women still stay in the labor marker although the wage level is lower than shadow price of raising children and housework. The strategy division of labor model based on dynamic game gives a good interpretation of this phenomenon. When a woman makes labor supply decision, if she anticipates the partnership will be fluid, she will increase labor supply, so she can choose employment to avoid a depreciation of human capital because of not participating in labor for a long time. This paper chooses crude divorce rate (X_5) reflecting the condition of divorce to analyze how the state of matrimony influence women's employment.

2. THEORY AND PROCEDURE OF GREY-CORRELATIVE-DEGREE ANALYSIS

Grey relational analysis is the main elements of Deng's theory of gray system and it is a system analysis technique. Grey system is the uncertain system with insufficient information, which means some information is known, and some information is unknown. As an important method analyzing grey system, the basic idea of grey-correlative-degree analysis is measuring correlative degree according to similarity level of geometric figure of sequences by insufficient information, and finding main influencing factors of system(Li, X.Q, 1995). But there are some defects in traditional grey-correlative-degree of Deng. Firstly because it is greatly influenced by minimum absolute difference and maximum absolute difference because correlative coefficient of each time point will be influenced if there is a maximum point or minimum in data sequence. Secondly, correlative coefficient of each time point will be influenced by sample size. Thirdly, correlative coefficient and correlative degree are influenced by resolution. The application scope of grey-correlative-degree analysis is hedged in with these defects, which are solved by T-Mode grey-correlative-degree analysis.

Calculation procedures of T-Mode relational analyses are as follows.

First step is to list unanalyzed data parameter series, and several compared series.

$$X_0 = \{x_0(1), x_0(2), ..., x_0(n)\}$$

$$X_i = \{x_i(1), x_i(2), ..., x_i(n)\}, i = 1, 2, 3......m$$

Second step is standardization to make series comparable, and standard series is solved.

$$D_i = \frac{1}{n-1} \sum_{k=2}^{n} |x_i(k) - x_i(k-1)|, i = 0, 1, 2, 3......m \quad (1)$$

$$Y_i = X_i / D_i = \{y_i(1), y_i(2), ..., y_i(n)\}, i = 0, 1, 2, 3......m \quad (2)$$

Third step is calculating increment series.

$$\Delta Y_i = \{\Delta y_i = y_i(k) - y_i(k-1)\}, k=2,3......n \ i=0,1,2,3......m \quad (3)$$

Fourth step is calculating correlative coefficient of each period of time.

$$\varepsilon[y_0(k), y_j(k)] = \begin{cases} sgn[\Delta y_0(k) \times \Delta y_j(k)] \times \dfrac{\min(|\Delta y_0(k)|, |\Delta y_j(k)|)}{\max(|\Delta y_0(k)|, |\Delta y_j(k)|)} \\ \\ 0, if \ \Delta y_0(k) \bullet \Delta y_j(k) = 0 \end{cases}$$

$$k = 2, 3......n \quad j = 1, 2, 3......m \quad (4)$$

Fifth step is calculating correlative degree.

$$r(X_0, X_j) = \frac{1}{n-1} \sum_{k=2}^{n} \varepsilon[y_0(k), y_j(k)], j = 1, 2, 3......m \quad (5)$$

3. GREY-CORRELATIVE-DEGREE ANALYSIS OF INFLUENCING FACTORS OF WOMEN'S EMPLOYMENT

Data of measuring indicators of related influencing factors and women's employment is as shown in the Table 1.

Table 1
Measuring Indicators of Related Influencing Factors and Women's Employment(1995-2010)

Year	X_0(%)	X_1 (year of 1995=100)	X_2 (%)	X_3 (%)	X_4 (person)	X_5 (%)
1995	38.6	100	24.8	35.4	3.23	0.88
1996	38.7	103.80	26	36.4	3.2	0.93
1997	37.9	104.94	26.4	37.3	3.19	0.97
1998	37.0	112.50	26.7	38.3	3.16	0.96
1999	38.0	127.23	26.9	39.7	3.14	0.96
2000	38.0	141.74	27.5	41	3.13	0.96
2001	37.8	163.28	27.7	42	3.1	0.98
2002	37.8	188.59	28.6	44	3.04	0.9
2003	37.9	211.23	29.3	44.5	3.01	1.05
2004	38.1	233.40	30.6	45.4	2.98	1.28
2005	37.9	263.28	31.4	46.9	2.96	1.37
2006	38.0	296.72	32.2	47.8	2.95	1.46
2007	37.8	337.07	32.4	49.12	2.91	1.59
2008	37.6	374.09	33.2	49.86	2.91	1.71
2009	37.2	421.23	34.1	50.25	2.89	1.85
2010	37.2	462.53	34.6	50.55	2.88	2.00

Source: China Statistical Yearbook 1996-2011 and China Labour Statistical Yearbook 1996-2011

From calculation, the value of D. can be get, D_0=0.2933, D_1=24.1687, D_2=0.6533, D_3=1.0100, D_4=0.0233, D_5=0.0867. After that, the standardization of data in Table 1 processes, and we can calculate increment series. Based on which, we can calculate correlative coefficient of each period of time, as shown in the Table 2.

Table 2
Correlative Coefficient of Each Period of Time

K	ε[0,1]	ε[0,2]	ε[0,3]	ε[0,4]	ε[0,5]
2	0.5483	0.8538	0.8451	0.8478	0.692
3	-0.0206	-0.0709	0.826	0.7682	-0.1033
4	0.8212	-0.1806	0.8219	0.4484	0.7452
5	0.8125	0.9083	0.8056	0.6691	0
6	0	0	0	0	0
7	-0.1435	-0.1417	0.6903	0.4956	-0.0065
8	0	0	0	0	0
9	0.7061	0.8637	0.8903	0.8478	0.864
10	0.6252	0.784	0.767	0.8956	0.8139
11	0.8639	0.8615	0.7602	0.7433	-0.0467
12	0.7073	0.8308	0.8835	0.7433	0.8733
13	0.7435	0.8417	0.7229	0.7717	0.9785
14	0.8744	0.9615	0.9328	0	0.71
15	-0.2992	-0.3900	-0.1831	0.6294	-0.3446
16	0.0000	0.0000	0.0000	0.0000	0.0000

T-Mode grey-correlative-degree can be calculated according to correlative coefficient of each period of time in Table 2, as shown in the Table 3.

Table 3
T-Mode Grey-Correlative- Degree

r_{01}	r_{02}	r_{03}	r_{04}	r_{05}
0.4159	0.4081	0.5842	0.5240	0.3451

According to the T-Mode grey-correlative-degree in Table 3, it can be seen that $r_{03}>r_{04}>r_{01}>r_{02}>r_{05}$.

4. POLICY ADVICES

As is calculated, T-Mode grey-correlative-degree of women employment influencing factors ranks as following: human capital investment, average size of household, wage level, development of tertiary industry and state of matrimony. Some policy advices are given based on the result to encourage female employment and construct healthy and harmonious labor market.

4.1 Raising the Level of Women Human Capital Investment

Women should have more modern characteristics in market economy, and raising the qualifications of women is very important. Women must raise the level of their scientific and cultural knowledge and vocational skills through education and training to strengthen their competitiveness in labor market. Therefore, our government should create social environment of eliminating gender discrimination that will cause difference in human capital investment. Law related with female employment protection has focused on raising the employment ratio and labor protection of women for a long time in China. With the advent of knowledge economic era, protecting equal human capital investment opportunities for women is also important. The government should sternly execute the law to protect the opportunity of fair human capital investment for women

while constitute feasible law, to promote women realize their self-valuation as much as possible.

4.2 Promoting Housework Socialization Actively

Under the traditional division of labor between females and males, a big family size means a heavy housework burden for women. Housework will cost women a lot of time and energy, and it will influence their performance in work. Therefore, employers tend toward male in labor market. It will cause negative influence on women employment. Socialization of housework means socialized production takes the place of housework took on by family members, and it can help women threw off the chains of heavy housework and do not have to worry about tending to their home, which will promote women participate in employment. At the same time, housework socialization can create more jobs suitable for women to resolve employment problem of women with poor skills.

4.3 Protecting Labor Income Right of Women by Legal Means

Chinese government attaches great importance to protection of rights and interests of women after foundation of China. According to related figures, the ratio of women personal income to men personal income is about 80% before opening up policy, and the principle of equal pay for equal work for men and women is basically in place in China. But this situation has changed since 80s with the economic transition. Although related law applies the principle of equal pay for equal work to men and women alike, and protects the right of women to work on equal terms with men, the wage gap between men and women continuously expanded. According to the report of Second Survey on Women Status hold by ACWF (All-China Women's Federation), the ratio of women personal income to men personal income is dropped from 77.5% to 70.1% from 1990 to 1999 in cities. Protection the right of labor income of women has been one of key point to promote women employment. Government need improve rules and regulations to protect the right of labor income of women, and women can act more vigorously in labor marker and have more employment opportunities.

4.4 Developing the Tertiary Industry to Promote Female Employment

Women have potential advantages in tertiary industry, and government should develop the tertiary industry to supply more jobs and promote female employment. Many areas focus on community employment and community services may supply many potential jobs. ACWF did surveys in Chongqing, Wuhan and other big cities, which indicate that 25% laid-off female workers have reemployed in community. Organizing laid-off female workers to work in communities can not only promote the construction of communities and the adjustment of industries, but also make residents life more convenient. In the coming 20 years, the traditional services and tertiary industry

will change a lot, and people will have new demands in food, clothes, housing, transportation, culture, education, sanitation, sports, environmental protection, telecom and traveling, which need to promote the development of modern services industry, and this will supply a new space for female employment. We should pay attention to the social demand and the change of market, and exploit and cultivate more jobs and raise the level of female employment, which will help women create new performance and lives.

CONCLUSION

This paper studies main social and economic factors influencing women's employment during transition in China. Based on mechanism of gray system theory, this paper calculates T-Mode correlative degree of these main factors. According to the T-Mode correlative degree, influencing factors rank as following: human capital investment, average size of household, wage level, development of tertiary industry and state of matrimony. Based on the analysis, this paper puts forward corresponding policy recommendations. Firstly, raising the level of women human capital investment can help women strengthen their competitiveness in labor market. Secondly, promoting housework socialization can help women throw off the chains of heavy housework, which will encourage women to participate in employment. Thirdly, the government should protect labor income right of women by legal means effectively. Finally, developing the tertiary industry will promote female employment. These policy recommendations will help to promote female employment and construct healthy and harmonious labor market during transition in China.

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