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Meta-regression Analysis of the Chinese Labor Reallocation Effect

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Abstract Meta regression analysis method was applied to study 23 papers about the effect of Chinese labor reallocation on the economic growth. The results showed that both the method of the World Bank (1996) or M. Syrquin (1986) had little impact on the results, while the calculation of the stock of physical capital had a positive impact on the results. The result by using panel data study was bigger than results obtained in the time series data. The time span had little influences on the results. Therefore, it was necessary to measure the exact stock of physical capital in China, so as to evaluate the Chinese labor reallocation effect

Key words Labor reallocation effect, Economic growth, Meta-regression analysis

1 Introduction

Since the study of scholars like M. Syrquin's (1986) on the contribution of the reallocation of production factors on the economic growth, researchers in China and abroad have studied the relation between the change of economic structure and the economic growth, especially the effect of labor reallocation to on economic growth, from theoretical and empirical aspects. Scholars in China follow suit in the study of the positive influence of reallocation of Chinese labor force on the economic growth. For instance, Guo Kesha (1992) deduced the Chinese labor force reallocation effect during 1979 and 1990 through M. Syrquin's method for the first time and concluded that the average effect at that period was 0.20% and the average contribution to the total output was 2.3%. He pointed out that the influence of Chinese production factors reallocation had little influences on the growth of production rate because the financial reallocation among departments was imbalanced and its relation to the labor reallocation was uncoordinated. Li Xuanlai *et al.* used M. Syrquin's method to study the transference of labor force in east, central, west China and the entire China, which were 2.19%, 1.67%, 1.52% and 1.90%, and its contribution to GDP growth was 19.30%, 17.25%, 15.51% and 10.89%. The calculation result of World Bank was that the average labor force reallocation during 1985 and 1994 was 1.1%. Cai Fang *et al.* (1999) extended World Bank's method (1996) and put in labor cost. They found that the average labor force reallocation was 1.62% during 1982 and 1997 and the average contribution towards GDP growth rate was 20.23%.

Although Chinese scholars have studied this problem again and again, the results differ greatly and there are lots of disputes against this question. Some scholars think that the influence of the reallocation of Chinese labor force on the economic growth was large and was the dominant driving factor for Chinese economic

growth. Other scholars held the idea that the effect had small influences on the economic growth in China. The reason why things happened was that the methods and data for research were different. At the moment, there are two types of studies on the reallocation of labor force: World Bank (1996) and M. Syrquin's method. Some experts use temporal sequence and others use panel data. Some experts studied ten years' changes, while others studied twenty years' changes. Some key variables were studied, such as the calculation of stock of materials and labor force. This research aimed to use Meta regression analysis to study the main reason of differences in reallocation of Chinese labor force.

2 Introduction of Meta regression analysis methods

Meta regression analysis is the method of empirical document in economics, which is firstly proposed by T. D. Stanley and Stephen B. Jarrell (1989). The introduction is the necessary element in economics and would foretell the rationality of their theoretical predictions and guide researchers to evaluate possible result of political choices. However, the traditional documents are very subjective, so some researchers have doubts about the conclusion. In order to solve this problem, the quantitative study method was applied into the rational choice of comprehensive analysis process. In the past twenty years, there were several successful Meta regression analysis cases in economics, such as study by T. D. Stanley on the minimum wage effect and study by Stanley and Jarrell on sex and salary differences, *etc.* Those Meta regression analyses clarified several disputable questions in economics.

Compared with traditional documents, Meta regression analysis method isn't only confined in the description and conclusion of document, and it explained and integrated some important parameters in relevant documents through all-round and systematic quantitative analysis. The Meta regression analysis is the restudy of previous studies, instead of simple repetitive study. The advantage of Meta regression analysis lays in the integration of some study subjects at certain stage, and overcomes some limitations in the single study, such as subject boundary and publication choice, *etc.* The step of Meta regression analysis was proposed by T. D.

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Stanley in 2001. Firstly, documents about relevant study subjects should be chosen from standard database, including published papers and work thesis, so as to reduce the potential deviation which is caused by random choice. Secondly, outline statistics decrease the common measurement. This step is difficult and is time-consuming. The nucleus is to find out the relevant variables of the subject, such as regression coefficient, flexibility, salary differences, t value and result of other statistics. Thirdly, variables should be adjusted. In this step, factors that would influence the dependent variables were determined. For instance, in the study of minimum salary, different data and calculation models were used to do visual variable code. Fourthly, the purpose of Meta regression analysis is to explain the differences in the documents. Fifthly, the Meta regression analysis is examined.

Following calculation model is applied in the Meta regression analysis according to Stanley and Jarrel (1989).

The explained variable Y_j in the Meta regression analysis is the estimated value of relevant variables in the j th document. N is the sample amount of Meta regression analysis. The explained variable Z_{kj} of K reflects the proxy variable of common characteristics

in all empirical studies to describe differences in sample choice, model enactment, data characteristics and evaluation method, *etc.* Different empirical studies made inconsistent conclusions about the contribution of the reallocation of Chinese labor force on economic growth, which reflects differences of reallocation of labor force. OLS estimation was applied to explain the influence of this factor on this study, if the estimated value of variables had great statistic analysis.

3 Sample data and variable analysis

3.1 Sample collection According to Google Scholar and CNKI, there are 24 articles about the reallocation of labor force during 1992 and 2011. Through investigation, there are 23 articles meet the requirement. Corresponding information was collected from the 23 articles, including author, published articles, characteristic of data sample (panel data and temporal sequence data), temporal range, model construction and calculation of stocks of material capital, *etc.* The documents about the reallocation of Chinese labor force are shown in Table 1.

Table 1 Documents about the reallocation of Chinese labor force

No.	Documents	Evaluation result//%	Methods	Characteristics of time	Duration	Whether to calculate fixed capital stock	Whether to calculate the flexibility of the output of input factors
1	Guo Keshu(1992)	1.56	M. Syrquin's(1986)	Temporal sequence	1979 – 1990	No	No
2	World Bank(1996)	1.1	World Bank(1996)	Temporal sequence	1985 – 1994	Yes	Yes
3	Hu Yongtai(1998)	0.6	World Bank(1996)	Temporal sequence	1978 – 1993	Yes	No
4	Cai Fang(1999)	1.62	World Bank(1996)	Panel data	1982 – 1997	Yes	Yes
5	Pan Wenqin(1999)	1.6	M. Syrquin's(1986)	Temporal sequence	1979 – 1997	No	No
6	Fan Jianyong(2001)	0.76	World Bank(1996)	Temporal sequence	1978 – 1999	Yes	No
7	Pan Wenqin(2001)	1.69	M. Syrquin's(1986)	Temporal sequence	1979 – 1999	No	No
8	Xu Xianxiang(2001)	11.4	M. Syrquin's(1986)	Temporal sequence	1979 – 1998	No	No
9	Ding Xiaoquan(2001)	1.11	World Bank(1996)	Temporal sequence	1979 – 1998	Yes	No
10	Hu Bin(2005)	1.13	World Bank(1996)	Temporal sequence	1980 – 2003	Yes	Yes
11	Li Xunlei(2005)	1.9	M. Syrquin's(1986)	Temporal sequence	1978 – 2003	No	No
12	Liu Zhanzhou(2007)	0.85	M. Syrquin's(1986)	Temporal sequence	1952 – 2003	No	No
13	Chen Tong(2008)	5.1	World Bank(1996)	Temporal sequence	1979 – 2006	Yes	Yes
14	Li Zhiqian(2008)	0.21	World Bank(1996)	Temporal sequence	1979 – 2005	Yes	No
15	Yao Zhanqian(2009)	0.32	M. Syrquin's(1986)	Temporal sequence	1986 – 2007	No	No
16	Wen Jie(2009)	0.193	M. Syrquin's(1986)	Panel data	1978 – 2007	Yes	Yes
17	Zhang Aiting(2009)	0.12	World Bank(1996)	Temporal sequence	1983 – 2004	Yes	Yes
18	Zhao Huiqin(2010)	0.785	World Bank(1996)	Panel data	1978 – 2007	Yes	Yes
19	Zhang Guangting(2010)	1.99	M. Syrquin's(1986)	Panel data	1997 – 2008	No	No
20	Zhang Pin(2011)	1.165	World Bank(1996)	Temporal sequence	1990 – 2008	Yes	Yes
21	Li Wenbin(2011)	6.73	M. Syrquin's(1986)	Temporal sequence	1979 – 2005	Yes	No
22	Feng Guoqiang(2011)	0.55	M. Syrquin's(1986)	Temporal sequence	1979 – 2008	Yes	No
23	Yue Longhua(2011)	2.32	World Bank(1996)	Temporal sequence	1990 – 2008	Yes	Yes

3.2 Explanation on variables Based on the steps of the Meta regression analysis given by Stanley (2001), the search of documents was completed. In order to do Meta regression analysis, the mean value of labor force reallocation was considered as dependent variable, and the data characteristics, the visual variable of output flexibility and the material fund stock were considered as independent variable to put into equation for regression a-

nalys. The variables in Meta regression analysis were shown in Table 2. Y stands for the contribution of reallocation of Chinese labor force and economic growth. E is virtual variable, which calculated the output flexibility of input elements. In nine pieces of papers out of 23 pieces, the output flexibility of input elements was calculated. Fifteen pieces of papers calculated the material capital stock. From the point of view data type, the searched doc-

uments either use panel data or temporal and sequence data. Only four papers use panel data and virtual variable of Datatype is used to describe the characteristics of this study. Interval depicted temporal span. Virtual variable Method is used to describe the study method for the research of reallocation of labor force. There are two types of methods, World Bank and M. Syrquin. The calculation steps of these two methods are different, so is the number of economic variable and calculation difficulty.

Table 2 Variables in Meta regression analysis

Variables	Explanation of variables
Y	Contribution of reallocation of Chinese labor force to the economic growth
Elas	Virtual variable;whether to calculate the output flexibility(1: yes,0:no)
K	Virtual variable;whether to calculate the material fund stock(1 = yes,0 = no)
Datatype	Virtual variable;whether to calculate the panel data(1 = panel data;0 = temporal sequence)
Interval	Calculation of time span
Method	Virtual variable;applied method(1 = World Bank(1996);0 = M. Syrquin)

4 Result of Meta regression analysis

After the determination of dependent variable and independent variable of Meta regression analysis, OLS is used to evaluate Meta regression formula. The sample content is 23 and no multi-liner question is found through the relevant coefficient matrix. There are differences among papers of same subject. The Meta regression analysis of the reallocation of labor force is listed in Table 3. The

Table 3 Estimated result of Meta regression analysis of reallocation of labor force dependent variables;reallocation of labor force (Y)

Independent variables	Estimated coefficient	P value
Elas	0.039 16	0.486
K	-0.463 2 ***	0.003
Datatype	0.071 34 *	0.063
Interval	-0.000 056	0.977
Method	-0.055 91	0.319
Absolute term	0.043 78	0.281
No. of observed value	23	
R ²	0.988 1	

Note: * stands for significance of parameter coefficient at 90% credibility level; ** stands for significance of parameter coefficient at 95% credibility level; *** stands for significance of parameter coefficient at 99% credibility level.

effect of labor force reallocation through World Bank method is smaller than that through M. Syrquin, but such difference is insignificant in statistics. The production flexibility of input element and time span had little influences on results, especially the time span. The influence of material stock in the result is significant, whether from statistic or coefficient aspects, because the calculation of material capital stock doesn't have same calculation standard. Besides, the calculation of material capital stock usually applies the internal calculation method, which means that the annual material input is studied. Because the national statistic department

revealed the investment of material capital now and then, many researchers have to deduce the result. The influence of panel data is also significant.

Through the above analysis, there are no systematic differences between M. Syrquin and World Bank methods in the reallocation of labor force. Just as M. Syrquin pointed out that the M. Syrquin method neglected other elements besides of labor and calculated employment changes based on mean value, instead of by-product, thus such measurement is incomplete.

5 Conclusions and discussions

The positive influence of the reallocation of labor force on economic growth is beyond question, especially to those developing countries. There are different opinions of the positive influences of labor force on economic growth in China. In fact, the difference of empirical study can be concluded as differences in choice of samples, model design, and evaluation methods, *etc.*

Firstly, in terms of study method, both World Bank and M. Syrquin have little influences on the result.

Secondly, the material capital stock has great influences on the results. The material capital stock would inevitably be included in the calculation of economic growth, especially the study of reallocation of production factors. How to calculate the variables scientifically directly influences the final result. This also is one of the reasons why Chinese experts pay attention to the study on material capital stock.

Thirdly, the result of panel data is generally higher than that through temporal sequence. Because of certain attributes of panel data, in some cases, panel data is more preferable.

Fourthly, the influence of temporal span on the result is small. In some cases, the longer temporal span, the larger differences. The reason why the influence of time span is small is that the study of reallocation of labor force neglects policy factor in economic changes.

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hours, labor safety, labor environment and protection of labor rights and interests; severely punish the employers which infringe upon workers' rights, to protect the legitimate rights and interests of laborers from the administration.

4.3 Strengthening vocational training for migrant workers so that workers have more choices on positions Vocational training not only includes on-the-job training of enterprises for employees, but also includes the government and relevant departments' job skills training for the workers. The enterprises' on-the-job training is mainly to carry out training needed by the corporate jobs for the workers, to enhance the quality of post for the workers, and improve the competitiveness and development potential of the workers in the post, so that the workers get more lucrative salary. Government's employment training for the workers includes vocational skills training, personal quality training for the workers. Attending evening university, self-study examination and other ways should be further promoted, to further improve the employment quality of workers.

4.4 Improving the working environment and developing good working atmosphere Under the conditions of market economy, the competition of modern enterprises is increasingly intense, and soft power is the key to success of one enterprise in the competition. Good working environment and atmosphere provides a good soft power for the enterprise, which can improve workers' en-

thusiasm for the work, increase the efficiency of the labor of workers, and make the workers have a sense of belonging to the enterprise. Therefore, in the process of production, enterprises should focus on the improvement of the working environment of workers, create good working atmosphere for workers and increase workers' satisfaction to retain qualified personnel and ensure that enterprises win in the fierce competition.

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