Peer-reviewed and Open access journal
ISSN: 1804-5006 | www.academicpublishingplatforms.com
The primary version of the journal is the on-line version

BEH - Business and Economic Horizons
Volume 12 | Issue 4 | 2016 | pp.164-172
DOI: http://dx.doi.org/10.15208/beh.2016.12

Rural human capital investment's driving effects to labor migration - An empirical study based on Vector Error Correction Model

Shihu Zhong [1,2], ***Tang Juan***[3]

[1]*Hunan University of Science and Technology, China*
[2]*Shanghai University of Finance and Economics, China*
[3]*Jinan University, Guangzhou, China*

Corresponding address: Hunan University of Science and Technology, Xiangtan, Hunan 411201,China

Based on vector error correction model, this essay aims to test the relationship between the rural human capital investment and labor migration by using the data of Hunan province from 1994 to 2014. Experiment results show the long-term balanced relationship between rural human capital investment and labor migration. Rural human capital investment can boost the transfer of labor force effectively in the long run. While none obvious effect would take in a short time. There is time lag effect on human capital investment. The time needed to amend the cointegration relationship would be long and the primary factor that affects the labor migration is the prophase investment of human capital.

JEL Classifications: J01, J20, J24, J43, R23

Keywords: Rural human capital investment, labor migration, vector error correction model (VECM), time lag effect

Citation: *Shihu Zhong and Tang Juan, 2016. "Rural human capital investment's driving effects to labor migration - An empirical study based on Vector Error Correction Model ", Business and Economic Horizons, Vol.12(4), pp.164-172, http://dx.doi.org/10.15208/beh.2016.12*

Introduction

Under the background of the obvious income gap between urban and rural areas and the tremendous rural surplus labor, there are surges an inevitable trend of labor migration from rural areas to urban areas and non-agricultural industries. Being a significant part of boosting labor transfer, the rural human capital investment has a role to play. Therefore, it is fundamentally important to analyze the motivation of labor migration from the perspective of human capital and get enlightenments from it to facilitate rural labor force shift.

Human capital investment in rural areas not only contributes to the increase of income directly but also accelerates labor transfer (Benjamin et al., 2000; Huffman, 2001; Yang Xinming and Luo Rundong, 2008). Some scholars explore the effect of human capital investment to rural labor transfer from the perspective of education, training, work experience and other factors which represent inalienable parts of the human capital investment. Xing Chunbing (2013) studies the regional differences in rates of returns to education and its impact on labor mobility; the results show that the rural labor with higher educational level is more likely to transfer to the urban areas. Zhang Shiwei et al. (2011) make a research on the training level of the transferred families before moving to city. The research finds out that training has a significant role to play in pushing the rural labor for migration. Ma Jinping and Zhou Yong (2013) investigate the income discrepancy of rural human capital considering the various training levels. They show that the training

can be classified or grouped, when it is arranged from strong to weak considering the strength it carries, to government training, corporate training and personal training. Jing Shenglan (2014) studies the causes of rural labor's salary changes in Zhejiang Province by utilizing the Mincer equation. His study argues that work experience is one of the most important factors affecting labor transferring and employment. There are also academics which put emphasis on the health condition and the gender. Some academics (e.g., Wang Meiyan, 2005 and Wang Zhen, 2010) find out that greater income disparity was caused by gender factor than other factors.

The above mentioned scholars believe that rural human capital investment exerts an important effect on labor transfer and they demonstrate it through some theories or empirical analysis. But there are still some flaws in their research. Their analyses on the effect of current rural human capital investment to rural labor migration are made from a static perspective. While the examination of cumulative effect and time lag effects of rural human capital investment are missing. There is an absence of discussion about the dynamic relationship between human capital investment and the transfer of rural labor. And we cannot distinguish the long-term effects and short-term effects.

Considering these, this essay has built a theoretical model which focuses on the dynamic relationship, both the long-term and short-term, between rural human capital investment and labor migration in rural areas based on the Vector Error Correction Model (VECM). In our view, this research will be well complemented because of the following innovation. Firstly, improvement of empirical model based on least square and variable difference method has been made and the implementation of the VECM can avoid spurious regression and multicollinearity. Secondly, error correction has been introduced so that the variable level information will not be missed. Thirdly, large varieties of robustness test of empirical analysis have been carried out to ensure the rationality of the econometric model building.

Research design

Model construction

Based on the human capital theory, this essay has chosen education, training, health, access to information, sex features as its research dimensions [10-12]. The preliminary measurement model is constructed as follows.

$$Rutra_t = \alpha + \beta_1 edu_t + \beta_2 inc_t + \beta_3 voedu_t + \beta_4 hea_t + \beta_5 com_t + \beta_6 sex_t \qquad (1)$$

Among them, the explanatory variables $edu_t, inc_t, voedu_t, hea_t, com_t, sex_t$ represent the investment growth rate, the per capita growth rate of income in rural areas, the rural vocational education investment growth rate, the per capita growth rate of health care expenditure, the per capita growth rate of consumption in transportation and communication, and sex ratio respectively. The explained variable $Rutra_t$ represents the number of rural labor transfer.

It takes long for the human capital investment to take effect, which can be concluded as time lag effect. Yet it will function to a much greater degree. Considering this, the endogenous variables of this model may influence each other, resulting in the establishment of vector autoregressive models. Vector autoregressive model (VAR) is a non-structural equation model based on the statistical properties of the data, which choose each endogenous variable as explanatory variables and the hysteresis value of all

endogenous variables as explanatory variables. It carries the function of analyzing or predicting related economic indexes. A general expression is as follows.

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_n y_{t-n} + Bx_t + \varepsilon_t \tag{2}$$

Where, y_t is the endogenous variable of the k-dimensional vector; x_t is the exogenous variable of the l-dimensional vector; n is the lag order and the sample number is t; $k \times k$ dimensional matrix $A_1, A_2 \ldots A_n$ and the $k \times l$ dimensional matrix B is the coefficient matrix to be estimated; ε_t is the k-dimensional disturbance vector.

Input of the related variables such as human capital and labor migration gives the vector autoregressive model whose endogenous variable lags n orders. The matrix form is shown below.

$$\begin{pmatrix} Rutra_t \\ edu_t \\ inc_t \\ voedu_t \\ hea_t \\ com_t \\ sex_t \end{pmatrix} = A_1 \begin{pmatrix} Rutra_{t-1} \\ edu_{t-1} \\ inc_{t-1} \\ voedu_{t-1} \\ hea_{t-1} \\ com_{t-1} \\ sex_{t-1} \end{pmatrix} + A_2 \begin{pmatrix} Rutra_{t-2} \\ edu_{t-2} \\ inc_{t-2} \\ voedu_{t-2} \\ hea_{t-2} \\ com_{t-2} \\ sex_{t-2} \end{pmatrix} + \cdots + A_n \begin{pmatrix} Rutra_{t-n} \\ edu_{t-n} \\ inc_{t-n} \\ voedu_{t-n} \\ hea_{t-n} \\ com_{t-n} \\ sex_{t-n} \end{pmatrix} + \begin{pmatrix} x_{1t} \\ x_{2t} \\ x_{3t} \\ x_{4t} \\ x_{5t} \\ x_{6t} \\ x_{7t} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \\ \varepsilon_{7t} \end{pmatrix} \tag{3}$$

If the time series variables we select are stationary, we can make a direct estimation through the VAR model. If the variables are non-stationary, consideration must be given to the cointegration relationship. There must be an expression of error correction model according to Granger theorem, where there is a cointegration relationship between some non-stationary variables. Therefore, when there is a cointegration relationship, the VEC model (also called the VAR model with cointegration constraints) shall be applied. VEC model can be deduced from autoregressive distributed lag model.

When there is no exogenous variable and there is a cointegration relationship in time series variables, the expression (2) can be modified as follow:

$$\Delta y_t = \alpha \beta' y_{t-1} + \sum_{i=1}^{n-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \tag{4}$$

The errors of equations above are steady because the unequal errors of the non-stationary variables containing cointegration relationship are stationary. The equation can be expressed below by vector error correction model.

$$\Delta y_t = \alpha ecm_{t-1} + \sum_{i=1}^{n-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \tag{5}$$

Where, $ecm_{t-1} = \beta' y_{t-1}$ is the errors amendment item reflecting the long-term balanced relationship of variables. Coefficient vector α represents the adjustment speed to recover

to a balanced state when the balanced relationship of the vector has deviated from the long-term balanced state. The difference items' return coefficients of explained variables represent the influence of the short-term changes exerted on the short-term changes of the explained variables. Lag difference items without apparent significance can be removed.

To sum up, a vector error correction model between the rural human capital investment and the labor transfer can be constructed as follows:

$$\Delta Rutra_t = \sum_{i=1}^{n-1} \alpha_i \Delta Rutra_{t-i} + \sum_{i=1}^{n-1} \beta_i \Delta edu_{t-i} + \sum_{i=1}^{n-1} \chi_i \Delta inc_{t-i} + \sum_{i=1}^{n-1} \delta_i \Delta voedu_{t-i} + \sum_{i=1}^{n-1} \gamma_i \Delta hea_{t-i} + \sum_{i=1}^{n-1} \lambda_i \Delta com_{t-i} + \sum_{i=1}^{n-1} \eta_i \Delta sex_{t-i} + \varphi ecm_{t-1} + \varepsilon_t \quad (6)$$

Variable specification and data sources

Based on the discussed models above, this paper studies the short-term and long-term influence which rural human capital investment exerts on the labor migration. The number rural labor transfer $Rutra_t$ represents the labor transfer variable. Taking its accessibility into consideration, the calculation method according to Statistics Yearbook of Hunan Province can be expressed as follows. The number of rural labor transfer in the specific year equals the increased population of the town in the specific year minus the natural growth population of the town in the specific year. The natural growth population of town equals the population in the town in the last year multiplied to the natural population growth rate of town. The growth rates of rural education investment edu_t, rural per capita income growth inc_t, rural vocational education $voedu_t$, rural per capita health care cost hea_t, rural households per capita consumption of transportation and communication com_t, gender ratio sex_t represent respectively education variable, training variable, health variable, information accessibility variable and gender features variable in human capital investment. The data are quoted from the Statistical Yearbook of Hunan province, China Statistical Yearbook and the Statistical Yearbook of education of Hunan province. The data sample range from 1995 to 2015 years. In order to eliminate the influence of heteroscedasticity and make the data more smooth, the operation of taking the natural logarithm of all variables has been made. So, we mark them as $LnRutra_t$, $Lnedu_t$, $Lninc_t$, $Lnvoedu_t$, $Lnhea_t$, $Lncom_t$ and $Lnsex_t$ respectively.

Results and discussion

ADF Test

Since many economic variables data in real life are usually non-stationary, the unit root tests have to be carried out firstly identify the stability and degree of integration of variables. Further, a cointegration relationship can only exist when the variables are of the same order of integration. The optimal lags are identified

by the Akaike information criterion (AIC) and the Schwarz criterion (SC) to ensure the correctness of testing results. ADF tests over time series data $LnRutra_t$, $Lnedu_t$, $Lninc_t$, $Lnvoedu_t$, $Lnhea_t$, $Lncom_t$ and $Lnsex_t$ were conducted by using the Stata13.0. The results are shown in Table 1.

TABLE 1. THE RESULTS OF UNIT ROOT TESTS

Variables	Forms (c,t,n)	ADF statistic	P value	conclusion
$LnRutra_t$	(c,0,0)	-1.42	0.9102	unstable
	(c,0,1)	-1.07	0.9341	unstable
$Lnedu_t$	(c,0,0)	-0.89	0.8674	unstable
	(c,0,1)	-0.67	0.8902	unstable
$Lninc_t$	(c,0,0)	-0.55	0.7981	unstable
	(c,0,1)	-0.51	0.8052	unstable
$Lnvoedu_t$	(c,0,0)	-2.23	0.3132	unstable
	(c,0,1)	-1.96	0.4120	unstable
$Lnhea_t$	(c,0,0)	0.44	0.7825	unstable
	(c,0,1)	0.32	0.8536	unstable
$Lncom_t$	(c,0,0)	-3.01	0.2963	unstable
	(c,0,1)	-3.11	0.3041	unstable
$Lnsex_t$	(c,0,0)	-0.65	0.6634	unstable
	(c,0,1)	-0.33	0.7023	unstable
$\nabla LnRutra_t$	(c,0,0)	-4.62	0.0124	stable
	(c,0,1)	-4.93	0.0231	stable
$\nabla Lnedu_t$	(c,0,0)	-7.63	0.0001	stable
	(c,0,1)	-8.12	0.0001	stable
$\nabla Lninc_t$	(c,0,0)	-3.98	0.0205	stable
	(c,0,1)	-4.21	0.0372	stable
$\nabla Lnvoedu_t$	(c,0,0)	-9.76	0.0001	stable
	(c,0,1)	-10.02	0.0001	stable
$\nabla Lnhea_t$	(c,0,0)	-6.22	0.0023	stable
	(c,0,1)	-6.37	0.0079	stable
$\nabla Lncom_t$	(c,0,0)	-3.13	0.0236	stable
	(c,0,1)	-3.42	0.0297	stable
$\nabla Lnsex_t$	(c,0,0)	-5.71	0.0001	stable
	(c,0,1)	-6.13	0.0001	stable

Annotation: Forms (c,t,n) represents constant term, time trend and lags. ∇ represents difference.

We can learn from the tests results that ADF value of $LnRutra_t$, $Lnedu_t$, $Lninc_t$, $Lnvoedu_t$, $Lnhea_t$, $Lncom_t$ and $Lnsex_t$ are larger than the critical values both at the significance levels of 1% and 5%, which indicates they have unit root and they are unstable. While the ADF values of their corresponding difference sequences are less than the critical value, which means the difference sequences are stable and the seven variables are of first-order integration.

Cointegration test

The research of Engel and Granger (1987) has shown that the linear combination of two or several non-stationary series possess a nature of stability. It will not change along the time, which testifies its stationary. That is, there is a cointegration relationship between

these variables. $LnRutra_t$, $Lnedu_t$, $Lninc_t$, $Lnvoedu_t$, $Lnhea_t$, $Lncom_t$ and $Lnsex_t$ are of first-order integration, which is the basic condition to conduct a cointegration test. Therefore, cointegration analysis can be done. There are two testing methods often used. One is the E-G two-step method based on the residual term of the regression equation. The other is the JJ test based on regression coefficients. The former one is often used to examine the relationship between two variables. And the latter is more suitable to test relationships between multiple variables. So this paper has chosen the JJ test initiated by Johansen and Juselius. Test results are shown in Table 2.

TABLE 2. RESULTS OF COINTEGRATION TEST

NULL HYPOTHESIS	ALTERNATIVE HYPOTHESIS	TRACE STATISTIC	CRITICAL VALUE OF TRACE STATISTIC	MAXIMUM EIGENVALUE	CRITICAL VALUE OF MAXIMUM EIGENVALUE
Number of cointegration equations	opposite	Trace statistic	5%	MaxEigen	5%
None	one	98.46351	67.21531	37.23651	26.41238
No more than one	two	63.32157	49.36442	24.06454	22.05393
No more than two	three	20.36832	29.74215	12.64831	16.43861
No more than three	four	13.43839	17.64532	3.64572	8.75436

The results of maximum eigenvalue test and trace test show that the null hypotheses for the "none" and "no more than one" cointegration equations were refused and the null hypotheses of "no more than two" and "no more than three" cointegration equations were accepted at a significant level of 5%. It means there are cointegration equation in $LnRutra_t$, $Lnedu_t$, $Lninc_t$, $Lnvoedu_t$, $Lnhea_t$, $Lncom_t$ and $Lnsex_t$.

A cointegration equation with normalized cointegration coefficients which can better reflect the relationships between variables is showed below.

$$LnRutra_t = 8.6732 + 2.3561\,Lnedu_t + 3.0124\,Lninc_t + 1.9347\,Lnvoedu_t + 0.9372\,Lnhea_t + 0.5369\,Lncom_t - 0.3276\,Lnsex_t + ecm \quad (7)$$

Where *ecm* represents error term. Unit root test of error term was carried out to identify the stability of cointegration relationship. The results show that ADF statistic value of the error term is -4.72, which is less than the critical value on the significance level of 1%. The cointegration relationship is stable.

The results of cointegration analysis for the period from 1994 to 2014 show a stable and effective long-term and balanced relationship between the number of rural labor transfer in Hunan province and investment growth rate of education in rural areas, growth rate of per capita income in rural areas, the growth rate of rural vocational education investment,

growth rate of per capita health care costs in rural areas, consumption growth rate of cost in transportation and communication and the male to female ratio. In the long run, there is a positive relationship between the number of rural labor transfer in Hunan province and investment growth rate, growth rate of per capita income in rural areas, the growth rate of rural vocational education investment, growth rate of per capita health care costs in rural areas, consumption growth rate of cost in transportation and communication. And the relationship between the number of rural labor transfer in Hunan province and the male to female ratio is negative. The elasticity of the number of rural labor force transfer to the investment growth of education in rural areas is 2.356, which means the change of 1% in education investment in rural areas will guide 2.356 percentage points change in the number of rural labor transfer of point in the same direction. Similarly, the change of 1% in growth rate of per capita income in rural areas, the growth rate of rural vocational education investment, growth rate of per capita health care costs in rural areas, consumption growth rate of cost in transportation and communication will cause the changes in the same direction in the number of rural labor transfer for 3.0124, 1.9347, 0.9372, and 0.5369 percentage points respectively. The change of 1% in the male to female ratio will guide the changes in the number of rural labor transfer of percentage point of 0.3276 in the opposite direction. This shows that education investment in rural areas, investment in training, medical investment and expansion of communications investments, in the long run, can speed up the transfer of rural labor, and the increase of the male to female ratio will slow down the transfer of rural labor.

Vector error correction model

The VEC model can be applied because there is a cointegration relationship between variables of rural labor transfer and rural human capital investment and the variables are unstable. ADF test of the model was carried out firstly to show there is no characteristic root dropping out of the unit circle. So the VEC model is stable. The estimation results of VEC are shown in table 3.The error correction term coefficients of the model are negative and its values have passed the critical values on the significance level of 1%, suggesting there is a reverse correction mechanism in the changes in the number of rural labor transfer. It testifies the long-term equilibrium relationships between variables. We can learn the following from the estimated results:

- The increase in growth rate of per capita income in rural areas, the growth rate of rural vocational education investment and consumption growth rate of cost in transportation and communication will boost labor transfer in a short period, though their elasticities are relatively small;
- There is no significant influence of investment growth rate of education and per capita health care costs in rural areas to the transfer of labor in a short time because of the cumulative nature and lag effect of educational and health care investment;
- The increase of the male to female ratio will slow down the transfer of rural labor at a significant level, which is closely related to the improvement of the status of women in society.

The DW values in the vector error correction model is 2.026761, which is bigger than the low critical value and lower than the high critical value on a significant level of 5%, suggesting that the model has passed the ADF test because there is no serial correlation in it.

TABLE 3. ESTIMATION RESULTS OF VEC MODEL

VARIABLES	$\nabla LnRutra_t$	$\nabla Lnedu_t$	$\nabla Lninc_t$	$\nabla Lnvoedu_t$	$\nabla Lnhea_t$	$\nabla Lncom_t$	$\nabla Lnsex_t$
$\nabla(LnRutra_t(-1))$	0.980236 (2.21273)	0.236571 (0.95673)	0.387652 (1.30687)	0.639761 (0.96347)	0.053971 (0.83267)	1.036753 (0.63257)	-0.068132 (-0.36753)
$\nabla(Lnedu_t(-1))$	3.767291 (1.06187)	2.638972 (3.76753)	0.976351 (0.76583)	0.968731 (1.12687)	-0.023681 (-0.39632)	0.036921 (0.26863)	0.912375 (0.86213)
$\nabla(Lninc_t(-1))$	0.968361 (3.71835)	1.035691 (1.12875)	1.637512 (3.98753)	0.886731 (0.36521)	0.008376 (0.56327)	0.063781 (2.36525)	0.006502 (0.27768)
$\nabla(Lnvoedu_t(-1))$	0.615763 (2.09812)	0.635791 (0.56382)	0.783561 (1.31067)	0.536712 (2.79831)	-0.369716 (-0.96551)	-0.068931 (-0.71536)	-0.007361 (-0.92365)
$\nabla(Lnhea_t(-1))$	0.876452 (0.47693)	1.683751 (1.01257)	-0.368752 (-0.96372)	1.368742 (1.01673)	0.093152 (1.32663)	-0.369223 (-1.08637)	0.536216 (1.03652)
$\nabla(Lncom_t(-1))$	0.602347 (2.76871)	0.675127 (0.35764)	0.367253 (0.75632)	-0.036721 (-0.67821)	1.086302 (1.21376)	2.367613 (2.86951)	0.869327 (0.37525)
$\nabla(Lnsex_t(-1))$	-0.468937 (-3.89732)	-0.236975 (-0.75631)	0.469731 (1.03687)	-0.368712 (-0.96371)	0.009673 0.85632)	0.622376 (1.76921)	0.000323 (0.06781)
Error correction term	-0.782149 (-3.65713)	-0.367523 (-2.97636)	-0.096371 (-3.86751)	-0.036791 (-2.47683)	-0.163721 (-3.97631)	-0.023981 (-2.87362)	0.668373 (1.25319)
Goodness of fit		0.586163		AIC		-9.862312	
Corrected goodness of fit		0.437289		SC		-9.258793	
DW		2.026761		Log-Likelihood ratio		320.6769	

Conclusion

This paper, based on error correction model, has tested the short-term and long-term relationships between rural human capital investment and rural labor transfer.

In the long run, there is a stable and effective long-term and balanced relationship between the number of rural labor transfer and educational investment growth rate in rural areas, growth rate of per capita income in rural areas, the growth rate of rural vocational education investment, growth rate of per capita health care costs in rural areas, consumption growth rate of cost in transportation and communication and the male to female ratio. The increases in rural educational investment, rural per capita income, rural vocational education investment, rural per capita health-care costs and increases in transportation and communication consumption of per capita households in rural areas will promote the transfer of rural labor. The rising of the male to female ratio will hinder the transfer of labor. If ranked by the influential level, they can be sequenced as follows with the per capita income in rural areas possessing the greatest influence: per capita income in rural areas, rural educational investment, rural vocational education investment, per capita health care costs in rural areas, transportation and communication consumption of per capita households in rural areas and gender ratios.

In the short term, growth rate of per capita income in rural areas, growth rate of the rural vocational education investment, growth rate of per capita consumption of transportation and communication exert a significant influence over the transfer of rural labor. While there is no significant effect in rural educational investment and per capita health care cost in rural areas.

Conclusions of this research show that the effect of educational and health-care investment in rural areas obviously lags. Such investment will not cause the transfer of rural labor in a short time. Educational investment and health-care investment are the very investment that lies in the key position in human capital investment. We must be aware of the significance of rural human capital investment. In the short term, we can boost the transfer of rural labor by increasing the investment in rural vocational education, per capita income and consumption of transportation and communication. And also, decreasing the male to female ratio is a fundamental way to promote labor transfer. In the long run, education investment and health-care investment can ensure a smooth transfer of rural labor.

Acknowledgments

This study is supported by: the Major Research Project of Philosophy and Social Science Fund of the Ministry of Education "Research on the establishment of long-term mechanism of the transfer employment of rural labor force" (11JZD018); Hunan Provincial Innovation Foundation For Postgraduate (CX2015B476); the National Social Science Foundation in China "Multidimensional coordinated development analysis of the main agricultural products processing industry agglomeration and its industry" (11BJY108); the Project of the Ministry of Education "Multidimensional coordinated development analysis of Major Cash Crop industry and its products processing industry agglomeration" (10YJA790064).

References

Becker G.S., 1964. Human capital: A theoretical and empirical analysis. Chicago: University of Chicago Press.

Becker G., 2012. "Growing human capital investment in China compared to falling investment in the United States", Journal of Policy Modeling, Vol.3494), pp.39-55.

Benjamin D., Brandt L., Glewwe P.W. and Guo L., 2000. "Markets, Human Capital and Inequality: Evidence from Rural China", William Davidson Institute Working Papers Series, pp.13-25.

Huffman W.E., 2001. "Human capital: Education and agriculture", In: Gardner, B.H. and Rausser, G.C. (Eds.), Handbook of Agricultural Economics, pp.29-37.

Jiang Shenglan, 2014. "Influencing factors of the backflow of migrant workers among provinces - an empirical analysis based on the questionnaire of returned migrant workers in Anhui Province", Journal of Agriculture Management, Institute of Ministry of Agriculture, pp.90-96.

Jiao Binlong, 2011. "Deposit effects exerted by human capital on residents' income gap", Chines Journal of Population Science, pp.27-38.

Ma Jinping, Zhou Yong, 2013. "Effects of different levels of training to the incomes differences of rural workers: The intermediary function of human capital", Journal of Wuhan University of Science and Technology (Social Science Edition), pp.250-253.

Wang Meiyan, 2005. "Gender wage differentials in China's urban labor market", Economic Research Journal [Jingji Yanjiu - in Chinese], pp.35-44.

Wang Zhen, 2010. "Study on the gender wage differentials of migrant workers based on quantile regression analysis", World Economic Papers, pp.51-62.

Xing Chunbing, 2013. "Regional differences in returns to education and its effect on labor mobility", Economic Research Journal [Jingji Yanjiu - in Chinese], pp.114-125.

Yang Xinming, Luo Rundong, 2008. "The interaction mechanism between human capital in rural areas and the income gap under the condition of technical progress", The Journal of Quantitative & Technical Economics, Issue 1, pp.74-84.

Zhang Shiwei, Jia Peng, Zhou Chuang, 2007. "The labor supply analysis of urban family transferred from rural areas", Chinese Journal of Population Resources and Environment, pp.35-42.