Regional Migration Differences and Economic Growth: Panel Data and Evidence in Western Region of China

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Abstract. Using data from several Chinese censuses, surveys and yearbooks, we provide a new perspective for the study of rural-urban migration, regional differences and economic growth of Gansu in China for 1990 to 2000. We find that economic conditions impact strongly on the growth relationship at provincial levels. Our results demonstrate that rural-urban migration favors growth in the economically stronger provinces, and that the full benefits of migration are realized when competition in local markets is at its strongest. From our results in is clear that polices need to be crafted at the provincial level to maximize the growth benefits of migration.

Introduction

Since Ravenstein (1899), numerous studies have explored various aspects of this pervasive phenomenon about rural-urban migration and its consequence. The most influential model of the rural–urban migration was suggested by Todaro (1969), which was extended made by Corden and Findlay (1975), Harris and Todaro (1970), Zarembka (1972), and Stiglitz (1974). The model starts from the assumption that migration proceeds in response to urban–rural differences in expected income rather than actual earnings. The source of the rural–urban income differential is ‘‘a politically determined minimum urban wage at levels substantially higher than agricultural earnings’’ (Harris & Todaro, 1970, p. 126). Migrants consider the various labor market opportunities available to them in the rural and urban sectors and choose one that maximizes their expected gains from migration. The model predicts that migration rates in excess of urban job opportunity growth rates are not only possible but also rational and even likely in the face of wide urban–rural expected income differentials. Central to the theory is that rural-urban migration is a natural and output–gain process in which surplus labor is withdrawn from the rural sector to provide needed manpower for urban industrial growth. Urbanization thus augments national income through short-run efficiency gains due to shifts of labor from low to high marginal productivity employment and long-run growth effects due to higher accumulation rates in urban sectors. Therefore, output growth, trend acceleration, and rising migration and urbanization are likely outcomes of the labor surplus model.

It was reforms and opening up that driven the market force to redistribute and mobilize the economic resources like labor force across the whole nation for the first time in China’s economic history. As a result, china has experienced a rapid and unprecedented process of rural–urban migration. That is to say, the majority of labor flowed across provinces are from the central and south-western regions, which are relatively densely populated, to the coastal regions where manufacturing industry prevails. This process of redistribution or mobilization acts as a driving force for the transformation of China’s economy from the traditional planned system into a market system accompanying with regional disparities development. In the year 2000, China launched the Western Development Strategy to speed up the development of western regions so as to narrow economic gap between regions in China. Migration has become a more effective factor of population redistribution and the relationship between migration and regional development is becoming stronger (C.Cindy Fan 2005). That is, rural-urban migration among different regions is indeed connected to the economic development level of these regions. As a result, rapid economic growth along with uneven regional economic development have created an unprecedented environment for massive rural-urban migration (Fan and

Stark, 2008; Liu, 2008; Brosing, 2007). Wu and Li (1996) survey the literature on China's rural-to-urban labor migration. Liang and White (1997) examine how economic conditions influence inter-provincial migration. The rural-urban gap in social and economic well-being, together with a massive reservoir of rural surplus labor and an acute shortage of consumer goods, formed the driving forces of China's change of migration-control policy and the rapid increase of rural migrants in Chinese cities (Wu and Yao, 2003; Yao, Zhang and Hanmer, 2004). In short, there have been many studies focusing on rural migration issues in China in the last two decades. This paper therefore does not intend to provide a survey on the literature of China's rural migration studies; an excellent literature survey was written by Zhao (2005).

The object of the research set out in this paper is the empirical analysis of rural-urban migration (RUM) and economic growth in west region in China so as to understand the regional disparities in development with regard to rural- urban migration. The unit for analysis for population migration in this paper is the "region", which refer to the province, municipality, or autonomous region under the level of central government. The west region in the paper refers to eleven provinces and one municipality, including Sichuan, Qhongqing, Yunnan, Guangxi, Guizhou, Tibet, Qinghai, Ningxia, Shanxi, Gansu, Inter-Mongolia and Xinjiang.

Date and Methodology

Data. In this paper, the number of rural–urban migration (RUM)1996-2008 can be found from the Labor Affairs Office, People's Government Gansu, and this number 1986-1995 can be utilized by the research project by Wang (2007 Gansu Academy of Social Sciences). Economic growth is measured as real GDP, all the data of economic growth are obtained from various Gansu Statistical Yearbook.

Methodology. Panel data model is one of the most important theories and approaches in recent years. It has great value in application of study on the nature of time series and cross section data. There are three kinds of panel data regression models: the polled models, the fixed effects model and random effects model. General, we often employ F test and Hausman test to determine best model in empirical studies. Based on the above analysis, we construct panel data model as follows. Let province i and time j operate in the following equation, so the impacts of URM on economic growth can be estimated:

$$y_{it} = \alpha_t + X_{it}^{'}\beta_t + \varepsilon_{it} \quad i = 1, 2, \cdots, N; \; t = 1, 2, \cdots T \tag{1}$$

In equation (1), y_{it} is the dependent variable, α_t shows the interception, $X_{it}^{'}$ and stands for K × 1 column vector of independent variables, β_i is K × 1 column vector of coefficients, K is the number of explanatory variables , ε_{it} is error.

For understanding regional RUM on economic growth, heteroskedasticity should be performed. Therefore, we set up the following model：

$$LNGDP_{it} = \alpha_i + \beta_i \ln RUM_{it} + \varepsilon_{it} \tag{2}$$

In the above equation, i =1,2,3,$\cdots$, represents different regions, i =1,2,3,$\cdots$, $t = i$ =1,2,3, $\cdots$, represents different years, α_i measures the cross section of each individual cell, which is the difference in different province or regions, ε_{it} is random disturbance. GDP_{it} represents economic growth in different provinces or regions. $LNGDP_{it}$ is the logarithm of GDP . RUM_{it} represents the rural-urban migration in different province or region in each years, and $LNRUM_{it}$ is the logarithm of RUM . If we get positive β_i based on estimation of the model, it indicates that RUM contributes to economic growth; contrarily, it means that RUM hinders economic growth.

Empirical Results

Pooled Model Test. We employ pooled model test to examine the relationship between RUM and economic growth, estimated by pooled ordinary least square (Pooled OLS) procedure.

$$LNGDP_{it} = 7.42 + 0.45LNRUM_{it} \quad (3)$$

$R^2 = 0.89 \qquad F = 463.98 \qquad DW = 0.97$

From the above results, we can conclude that $0 < DW < D_L$ =1.58. So there is autocorrelation in the model. In order to overcome the autocorrelation, we can add appropriate number of AR entry to the model. The results are as follows:

$$LNGDP_{it} = 13.7 + 0.18LNRUM_{it} + 0.45AR(1) + 0.52AR(2) \quad (4)$$

$R^2 = 0.93 \qquad F = 232.45 \qquad DW = 2.6$

From DU=1.64< DW <4- DL =2.42, we can conclude that the autocorrelation has been eliminated . The Eviews 6.0 shows the following results:

Table 1 The results of pooled model test

Variables	Coefficient	Std.Error	T-Statistic	Prob.
C	13.37171	6.439958	2.076367	0.042
LOG(RUM)	0.182785	0.081547	2.241457	0.0286
AR(1)	0.441062	0.109607	4.024047	0.0002
AR(2)	0.520343	0.113633	4.579172	0.0000
R-squared	0.918286F-Statistic			232.456
Adjusted R-squared	0.914332Prob(F-statistic)			0.0000
Durban-Watson stat	2.400256			

Entity Fixed Effects Model Test. The results of entity fixed effects model test are as follows:

$$LNGDP_{it} = 6.6D_t + 7.15D_2 + 6.8D_3 + 0.54LNRUM_{it} \quad (5)$$

$R^2 = 0.93 \qquad F = 210.03 \qquad DW = 1.04$

In this model, D_1, D_2, D_3 is defined as follows:

$D_i = 1$ if it belong to the region i ; $D_i = 0$ if it does not belong to the region i .

Table 2 The results of entity fixed effects model test

Variables	Coefficient	Std.Error	T-Statistic	Prob.
C	6.852987	O.177898	38.52195	0.0000
LOG(RUM)	0.543119	0.032519	16.7015	0.0000
Fixed Effects(cross)				
DB-C	-0.251524			
ZB-C	0.307281			
XB-C	-0.055757			
R-squared	0.931339F-Statistic			210.1953
Adjusted R-squared	0.9O4339Prob(F-statistic)			0.000000
Durban-Watson stat	1.043846			

Entity Random Effects Model Test. The results of entity random effects model test are as follows:

$$LNGDP_{it} = 6.68D_1 + 7.37D_2 + 6.56D_3 + O.57LNRUM_{it} \quad (6)$$

$R^2 = 0.87 \qquad F = 298.00 \qquad DW = 0.98$

Where D_1, D_2, D_3 is defined as follows:

$D_i = 1$, if it belong to the region i ; $D_i = 0$ if it does not belong to the region i .

Table 3 The results of entity random effects model test

Variables	Coefficient	Std.Error	T-Statistic	Prob.
C	6.888673	O.234571	29.3671	0.0000
LOG(RUM)	0.53615	0.031467	16.98564	0.0000
Fixed Effects(cross)				
DB-C	-0.206754			
ZB-C	0.2965348			
XB-C	-0.053566			
R-squared	0.805013F-Statistic			210.1953
Adjusted R-squared	0.804229Prob(F-statistic)			0.000000
Durban-Watson stat	0.9743846			

Redundant Fixed Effects Test. In the results of entity effects model, we employ redundant fixed effects test to decide which model should be established, the pooled model or the entity effects model. The original hypotheses and alternative hypothesis are given below:

H0: the individual sections of different items are the same in the model (pooled model)

H1: the individual sections of different items are different in the model (entity fixed effects model)

The results of F test show in Table 5. The P value of F test is smaller than 0.01. So we can reverse the original assumption of the 1% level. Therefore, we should establish the entity fixed effects model.

Table 4 The results of F test

Redundant Fixed Effects Tests			
Pooled:POOL01			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.871999	-2.68	0.0044
Cross-section Chi-square	11.470592	2	0.0032

Hausman Test. We use Hausman test to decide which model should be established, the entity fixed effects model or the entity random effects model. The original hypothesis and alternative hypothesis are as follows:

H0: Entity effects α_i and explanatory variables are independent (entity random effects model)

H1: Entity effects α_i and explanatory variables are related (entity fixed effects model)

The results of F test are as given in Table 6. The P value of F test is smaller than 0.05. So we can reverse the original assumption of the 5% level. Therefore, we should establish the entity fixed effects model.

Table 5 The results of Hausman test

Redundant Fixed Effects Tests			
Pooled:POOL01			
Test cross-section fixed effects			
Test Summary	Chi-Sq.Statistic	Chi-Sq.d.f.	Prob.
Cross-section random	0.80797	1	0.0368

The above analysis shows that the effects of RUM on economic growth of China can be estimated by the regression equation (5). R^2 is equal to 0.93, which meets the requirements. We can conclude that 1% increase of RUM will cause 0.48% increase in GDP in China. So, RUM can promote economic growth of China in general.

Conclusions and Discussions

This paper has analyses of the linkage between rural-urban migration and economic growth Gansu province in China for 1990 to 2000 by conducting entity fixed effects model test, entity random effects model test, redundant fixed effects test and Hausman test. The results show that economic conditions impact strongly on the growth relationship at provincial levels. The implications regard migration and economic growth may be drawn from this study. First, the pace and scale of the migration and GDP should be determined by and consistent with economic development levels. Second, the local government should be prepared to deal with increasing migrants in the near future due to potential growing rural–urban gap.

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