Regional disparity and economic growth in China
The impact of labor market distortions

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Abstract

The paper tries to analyze China’s regional disparity in a framework of convergence in neoclassical theory of growth. We employ comparative productivity of agricultural labor as an index of labor market distortion to see the impact of difference of labor market maturity among regions on regional growth performance, controlling for a set of variables determining growth rate. The finding is that (1) there is an evidence of conditional convergence in China’s growth, namely, per capita GDP in the initiative year is negatively related to growth rates in following years, (2) labor market distortion negatively impacts regional growth rates, and (3) many other variables used at previous studies impact growth performance, as is expected by neoclassical theory of growth. © 2002 Elsevier Science Inc. All rights reserved.

Keywords: Regional disparity; Conditional convergence; Labor market distortion

1. Introduction

It is widely observed that the income gap between regions in China widened with economic reform. Careful examination of income disparity shows that it first narrowed and then widened drastically (see, for example, Chen & Fleisher, 1996; Jian, Sachs, & Warner 1996). Scholarly studies have examined political, historical, and geographic factors causing increasing disparity across regions and warned of possible severe consequences that could shake the political regime (see Wang & Hu, 1999). Other studies have argued that the overall regional disparity of the country as a whole could be mostly attributed to the large and increasing income gap between eastern, central, and western regions (Lin, Cai, & Li, 1997).
From the standpoint of growth theory, increasing regional disparity can be expressed either in terms of regional disparity of growth rates or \( \beta \) convergence (which subsumes the opposite divergence) or in terms of \( \sigma \) divergence (which subsumes its opposite), increasing regional dispersion of per capita income. We choose the analytical framework of convergence to examine causes of growing economic inequality among China’s regions.

One of the legacies of Chinese traditional development strategy is rural–urban labor immobility that is probably much more severe than in other developing and transition economies. This paper focuses on the impact of lagged labor market reform on increasing regional disparity in China. We investigate the impact of labor mobility on the differences and relative changes in steady states among the eastern, central, and western regions and their contribution to overall income disparity in China.

The rest of this paper is organized as follows. Section 2 identifies two effects of reform—improvement in technical and allocative efficiency—and explains the possible impacts of reform at different stages on growth performance and changing patterns of regional inequality in per capita income. Section 3 examines the difference of labor market development among regions and its negative effect on convergence of growth. Section 4 discusses the empirical frameworks on regional disparity in China. Section 5 explains the data and variables used in our model. Section 6 employs a set of relevant variables to estimate the effect of allocative efficiency that impedes central and western regions from catching up with coastal areas. Section 7 concludes with policy implications.

2. Reform, growth, and regional disparity

Economic reform in China facilitated growth both by enhancing incentives for both managers and workers (increasing technical efficiency) and by promoting allocative efficiency through mobility of capital and labor away from uses in which China does not have a comparative advantage (Desai & Martin, 1983; Lin, Cai, & Li, 1996). The household responsibility system began in Anhui and Sichuan provinces, and experimental reform of SOEs, aimed at enlarging autonomy while sharing profits with the state, also began in the western regions (e.g. Sichuan province). The progress of reform was uneven, both in terms of time, type, and geographical transmission. At the time, agricultural output counted for nearly one-third of total GDP in the country and even more in the central and western regions. Because the initial stages of reform particularly benefited agricultural development, which was relatively important in the central and western regions where productivity was very low, it reduced regional disparity. The early stages of reform may be characterized as Pareto-improving, so that almost all regions, where economies had been dominated by inefficient SOEs and collective agriculture, benefited from the reform. However, reform was not aimed at improving how well markets—particularly interregional markets—worked.

The traditional planning system could not efficiently reallocate the new resources that became available as a result of micromanagement reform. Thus, although resources were allocated more efficiently among industries within provinces and regions, the benefits of reform differed across regions. Further reform was necessary to facilitate geographic mobility.
of capital and labor. Two factors contributed to differential economic growth benefiting the eastern regions relative to the west and central regions. First was the decline of agricultural production in GDP and the increase in the share of rural industry, which was much more pronounced in coastal areas than in the interior. This resulted in resource reallocation that was unfavorable to central and western regions. Second, the opening-up policy was confined to coastal areas, endowing the east with an advantage in adjusting industrial structure and diversifying ownership not available in other regions.¹

The regional growth pattern in the period of reform reflects convergence within two “clubs,” the eastern regions and the central and western regions combined. To illustrate between-group and within-group growth patterns, we divide the two clubs into two subgroup, defined as leading and following.² The growth rates of these four groups are illustrated in Fig. 1, where we observe that the eastern following group experienced greater growth than either the western following group or the eastern leading group, leading to divergence between eastern and central/western regions and convergence within the two regions. Fig. 2

¹ Opening-up policies included the formation of the special economic zones and open cities. These reforms were not extended to the central and western regions until the 1990s.
² We calculate the population-weighted average per capita GDP in an initial year and define provinces with above average per capita GDP per capita as members of a leading group and those below average per capita GDP as a following group. The eastern leading group includes Beijing, Tianjin, Shanghai, and Liaoning, while the eastern following group includes Zhejiang, Jiangsu, Guangdong, Fujian, and Hainan. The western leading group includes Shanxi, Inner Mongolia, Jilin, Heilongjiang, Hubei, Jiangxi, Xizang, Qinghai, Ningxia, and Xinjiang, while the western following group includes Anhui, Henan, Hunan, Sichuan, Guangxi, Yunnan, Shaanxi, and Guizhou.
illustrates a similar “V” trend in three indices of interprovincial inequality over the period 1978–1998. During the first years of the reform period from 1978 to the late 1980s and early 1990s, regional disparity decreased as indicated by declines in the coefficient of variation of log income from 0.59 in 1978 to 0.43 in 1990, in the Theil Entropy Index from 0.28 in 1978 to 0.12 in 1990, and in the Gini coefficient from 0.35 in 1978 to 0.25 in 1990. In contrast, after the early 1990s, the income gap rose to approximately the same level as in 1978.

Fig. 3 decomposes the Theil Entropy Index\(^3\) of regional inequality into four sources—intra-eastern, intra-central, intra-western, and interregional disparities. While overall regional disparity exhibits the V-shaped trend shown in Fig. 2, within-regional inequality has narrowed—so called club convergence, implying a dominant role for interregional disparity (Cai & Du, 2000; Lin et al., 1997). Intra-western and intra-central contributions to overall inequality have been insignificant, while intra-eastern and interregional disparities have counted for over 95% of the total disparity. The end of the decade of the 1980s roughly divides the reform era into two periods, with disparity within the eastern region dominating in the first and inequality among the three regions in the second. The horizontal 50% line highlights the trend in the contributions from two sources of inequality.

The growth rate of each eastern province was negatively correlated to its starting income level in the period of 1978 and 1998, implying absolute $\beta$ convergence (Cai & Du, 2000) resulting from increased allocative efficiency. Assuming that during this period technical efficiency gains from micromanagement reform was about the same in all three regions, the big question for the 1980s is whether and why growth from resource reallocation of resources

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\(^3\) See Shorrocks (1980) for the technical details of the decomposition.
differed interregionally. We believe that the answer, as suggested in recent research (Lardy, 1994, pp. 8–14: Yang & Cai, 2000), lies in differential factor market development.

3. Regional differential in maturity of labor market

The traditional economic system in China served state strategy that gave priority to heavy industry. In a capital scarce economy, allocation of resources through the market mechanism would be unlikely to promote development of capital-intensive heavy industry. A highly centralized planning system was formed to allocate scarce resources to priority sectors. Under such a system, capital and labor were neither allowed nor necessary to migrate across sectors and regions in accordance with market signals. Consequently, the People’s Commune System and Residence Registration System (hukou system) were implemented to prevent mobility of capital and labor from rural to urban sectors. More precisely, any mobility of factors of production among regions, industries, and even enterprises with different ownership was deemed illegal. The hukou system and attendant urban-biased policies, such as rationing of food and living necessities, exclusive employment, and provision of welfare, effectively prevented rural workers from migrating to cities.

Prior to the beginning of rural reform, there were no noticeable labor flows among sectors and regions. In addition to strict policies limiting migration, maintaining a highly capital-intensive industry structure further limited the economy’s capacity to absorb surplus labor released with the growth of labor productivity in agriculture. There resulted in distortions in factor markets with an excessive concentration of capital in urban areas and of labor in rural

![Graph showing contributions of intraregional and interregional disparities to income inequality in China, 1978–1998.](image)

**Fig. 3.** The contributions of intraregional and interregional disparities to income inequality in China, 1978–1998.

Source: Author’s calculation based on the *Provincial Data in 50 years of People’s Republic of China: China Statistics Press, 2000*
areas. Since the late 1980s, various reforms have created opportunities and an environment more conducive to factor movement from low-productivity sectors to high-productivity ones. Mass labor exodus from the countryside has been the most impressive result. It is now accepted that the transfer of underemployed or surplus rural labor to unskilled jobs in urban sectors and TVEs contributed greatly to China’s GDP growth in the postreform period (Cai & Wang, 1999; World Bank, 1997). Even so, labor market reform has lagged far behind reforms in other areas. While rural workers are able to move out of their home villages, serious inhibitions prevent rural migrants from settling permanently in cities. First, the urban segregated labor market sets barriers for migrant access to a variety of jobs and posts. Second, because of incomplete urban social service reform, outside workers are unable to obtain necessary housing, medical care, and children’s education at reasonable prices. Third, migrants without local hukou are often dispelled by urban authority simply because they are outsiders and therefore may contribute to instability and crime.

Distortions created by institutions related to hukou deter labor market development in two ways. Firstly, rural–urban and inland–coastal migration has not reached a scale necessary to eliminate important misallocations of resources. Secondly, the scope of labor flows that are allowed is still regionally limited. Analyzing data from a 1% population survey in 1995 showing a large proportion of both rural–urban and rural–rural migration is intraprovincial. When migrants go beyond provincial borders, a majority migrate only within the eastern, central, and western areas, respectively (Table 1). China’s emerging labor market is still mainly regional in scope.

We conceive labor mobility as shaped as a three-stage process—labor moves from agricultural to nonagricultural sectors locally in a first stage then moves to more advanced rural areas or local small towns in a second stage and finally to the cities in a third stage (Cai, 1999). Below, we examine what has happened to eastern, central, and western surplus workers, respectively, as they move through these stages of migration experience.

The eastern region has had advantages in developing rural nonagricultural employment opportunities due to (1) a richer heritage from former commune and brigade enterprises, (2) stronger financial foundations from established collectives, and (3) favorable government policies that made these regions attractive to outside investments. As a result, large numbers of rural laborers in coastal regions previously engaged in agriculture shifted to employment in TVEs, while rural laborers in central and western regions had fewer opportunities to change

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Rural to urban</th>
<th>Rural to rural</th>
</tr>
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<tr>
<td>Intraprovincial</td>
<td>68.4</td>
<td>75.3</td>
<td>54.6</td>
</tr>
<tr>
<td>Intraregional</td>
<td>80.4</td>
<td>84.8</td>
<td>71.7</td>
</tr>
<tr>
<td>Of which</td>
<td></td>
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</tr>
<tr>
<td>Within east</td>
<td>93.1</td>
<td>95.1</td>
<td>87.2</td>
</tr>
<tr>
<td>Within central</td>
<td>67.7</td>
<td>72.7</td>
<td>58.6</td>
</tr>
<tr>
<td>Within west</td>
<td>72.4</td>
<td>75.6</td>
<td>69.0</td>
</tr>
</tbody>
</table>

their sector of employment. After the initial migration that occurred during the beginning of
reform, underemployment in the agricultural sector of inland areas remained greater than in
the eastern region and led to further divergence of incomes.\(^4\) The cumulative regional
differential in labor allocation shaped by the first and second stages of labor mobility shaped
outcomes in the third stage of labor mobility. Laborers with less mobility tended to lack
migration-related physical, human, and social capital and had less ability to overcome the
obstacles deterring their migration to distant destinations. With governments in large and
medium-sized cities and even many small towns in the east enacting various discriminatory
policies against migrants from other areas, migrants from inland areas face stronger obstacles
to migration from their hometowns than their counterparts from coastal areas.

The regional discrepancies in labor shifts described above have caused labor market
development in inland areas to cumulatively fall further behind development in the east/
coastal regions. After benefiting from both technical and allocative efficiency, provinces in
the east that were relatively poor in the prereform period have rapidly converged toward their
steady-state growth rates, narrowing the disparity in income among eastern provinces. This
intra-eastern region convergence dominated increasing interregional disparity, contributing to
overall national reduction of provincial inequality during the first period of reform. In the
1990s, overall regional disparity dominates due to lower growth in western regions as a result
of fewer improvements in resource reallocation.

Labor market segmentation has resulted in China having a considerably larger proportion
of its population classified as rural when compared to other countries at comparable stages of
development. Compared to selected countries with similar per capita income to China,\(^5\)
China’s economic structure is also atypical in terms of urbanization, agricultural share of
labor and output, and productivity of agricultural labor. As a result of its imbalance of labor
allocation between rural and urban areas, China’s rural sector produces a smaller share of
output with a larger proportion of the labor force than we should expect on the basis of
comparison with benchmark countries.

4. Empirical approaches to regional disparity

There are two strands of empirical literature, growth accounting and growth regression, on
economic growth. The growth accounting literature apportions output growth among changes
in measurable input quantities, such as physical capital, labor, and augmented human capital,
as well as a residual called “total factor productivity” (TFP). Using the method of TFP
decomposition based on a frontier production function, Wu (1995) compared the productivity
and efficiency performance among coastal provinces and interior regions and among three

\(^4\) The fact is that the ratios of surplus labor to the total in central and western regions were higher than that in
eastern regions. Refer to Carter, Zhong, and Cai (1996) for estimates of surplus labor by province.

\(^5\) In 1999, China was ranked 128 in the world by PPP measured per capita GDP. Therefore, we select countries
ranked from 123 to 133 (World Bank, 2001), which are roughly at the same development level as China. It turns
out that China had the highest proportion of agricultural labor and lowest labor productivity in agriculture.
sectors—state-owned industry, rural industry, and agriculture. He found that the gap between the coastal region and the other two regions is large in the state and agricultural sectors but small and narrowing over time in the rural industrial sector. In another study, Fleisher and Chen (1997) explored the determinants of TFP and its growth. They found that investment in higher education and foreign direct investment helped to explain the TFP gap between coastal and noncoastal regions. Because the return of investment in human capital is about 20% higher in the noncoastal areas and rates of return to infrastructure investment tend to be lower in the interior than in coastal provinces, more investments in education in inland provinces are recommended. Cai and Wang (1999) and the World Bank (1997) found a significant contribution of labor mobility to the TFP and GDP growth rate during the reform period. However, Topel (1999) has suggested that a limitation of growth accounting is that it is silent about how the labor market works during economic growth. Labor market distortion is a defining institutional characteristic of China compared to other developing and former planned countries, and China’s labor market development and its disparities among regions are fundamental causes of differences economic growth among China’s provinces.

Growth regression studies have been used to explain differences in economic performance across nations and regions. Assuming diminishing returns to capital, neoclassical growth theory predicts a convergent growth trend among nations or regions, i.e. poor countries or regions tend to grow faster than rich ones (Mankiw, Romer, & Weil, 1992). By holding constant a set of variables characterizing differences in regions’ or countries’ steady-states, many studies have found convincing evidence of “conditional convergence.” In China’s case, conditional convergence has been found across China’s provinces (Cai & Du, 2000; Chen & Fleisher, 1996). Numerous variables have been found to explain differences in steady states and thus impact economic growth paths (Sala-i-Martin, 1996). Results from studies of conditional convergence literature imply that (1) poor economies tend to grow faster than rich ones and (2) appropriate changes in conditions that limit growth may help to accelerate it.

In the following paragraphs, we develop a simple model that incorporate China’s defining institutional characteristics in an explanation of the labor market’s contribution to differences in regional growth. Assume each region $i$ has a production function satisfying the following properties:

$$Y_i = A_i K^\alpha L^{1-\alpha}$$

where $A$ is TFP and $K$ and $L$ are capital and labor, respectively (Eq. (1)). Factor productivity is determined by technical efficiency $T_i$ and allocative efficiency $V_i$:

$$A_i = A_i(T_i, V_i).$$

Factor productivity is assumed to satisfy the Inada conditions (see Barro & Sala-i-Martin, 1995, pp. 16–17). This implies that technical efficiency has a great marginal contribution to

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6 Such variables as the starting level of per capita income, human capital, rate of saving, fertility rate, political stability, and degree of democracy are widely used and considered by economic theory to be relevant (Barro, 1998).
factor productivity when $T_i$ is extremely depressed and that its marginal contribution to factor productivity converges to a constant as technical efficiency improves:

$$\lim_{T_i \to 0}(A_{T_i}) = \infty; \lim_{T_i \to \infty}(A_{T_i}) = c \quad \text{where} \quad A_{T_i} = \frac{\partial A_i}{\partial T_i}$$

The lack of market reforms did not limit the contribution of technical efficiency improvements to productivity growth. Thus, factor productivity tended to converge among regions:

$$A_{T_i} = A_{T_j}, \quad i \neq j$$

where $A_{T_i}$ stands for the change of technical efficiency in one region with respect to time.

Allocative efficiency, however, is positively related to the level of market development. Assuming all regions had a similar level of allocative efficiency under the planning system, after reform, allocative efficiency has contributed more to factor productivity growth where factor markets are less distorted, leading to interregional disparities in the marginal contributions of allocative efficiency to productivity growth:

$$A_{V_D} < A_{V_N}$$

(2)

where $A_{V_D}$ stands for marginal contributions of allocative efficiency to productivity where factor markets are distorted and $A_{V_N}$ stands for marginal contributions of allocative efficiency to productivity where factor markets are well developed (Eq. (2)). Because the marginal contribution of technical efficiency converges to a constant, the difference in factor productivity is independent of changes in technical efficiency, and allocative efficiency is the main determinant of disparities in factor productivity (Eq. (3)):

$$A(V_D) = \frac{1}{1 + \lambda} A(V_N)$$

(3)

Therefore, output in steady states differ as a result of distortions associated with allocative inefficiency:

$$\frac{y_N}{y_D} = 1 + \lambda$$

(4)

Thus, differences between technical and allocation efficiencies result in differential growth rates among regions. At the stage dominated by the improvement of technical efficiency, regional disparity narrowed. When economic reform reached the stage dominated by efforts to improve allocative efficiency, regional disparity widened. To model this process, we employ the following Sala-i-Martin (1996) model (Eq. (5)):

$$\gamma_{i,t} = \alpha_i - \beta \log(y_0) + \chi X_{i,t} + \epsilon_{i,t}$$

(5)

where $X_{i,t}$ denotes a set of control variables for economy $i$ in its steady state, including labor market variables, the investment rate, human capital, and others suggested by Barro (1998). Section 5 describes the variables in detail.
5. Data and variables

In our empirical analysis on the impact of labor market maturity on regional growth under the assumption of conditional convergence, we mainly utilize panel data by province between 1978 and 1998. We take annual growth rates of per capita GDP as the dependent variable and per capita GDP in the starting year (i.e. 1978), human capital in starting year, comparative labor productivity, the labor force participation rate, a marketization index, the share of government expenditure in provincial GDP, the investment rate, and a measure of investment efficiency as independent variables. We use average years of school calculated according to census data in 1982 to represent the level of initial human capital stock. All the other variables defined in detail below and are compiled from the *Provincial Data in 50 years of People’s Republic of China* published by the State Statistical Bureau. The final regression results are based on 29 observations, including the municipalities directly being under the jurisdiction of central government, minority autonomous regions, and provinces. Tibet and Chongqing are excluded because of missing data. A central issue of our research is the allocation of labor between the agricultural and the industrial sectors. To measure the intersectoral allocative efficiency of labor, we use the ratio of labor productivity in agriculture to labor productivity of industry to indicate the degree to which the share of labor force exceeds the share of output in agriculture disproportionately and the change in the intersectoral allocative efficiency of labor. It is calculated by dividing agricultural value added (the primary industry GDP) by agricultural labor forces to obtain labor productivity of agriculture and industrial value added (the secondary industry GDP) by industrial labor forces to get labor productivity of industry and then calculating the ratio. Under the assumption of no barriers to factor mobility, movement of capital and labor between sectors would result in equal value of marginal product for all factors among sectors. That is to say, the value of the comparative productivity of agricultural labor equals to 100%. On the contrary, if the factors markets are imperfect, the institutional and policy barriers hinder the mobility of capital and labor from the low-productivity agricultural sector to the high-productivity industrial sector. Then, the value of the comparative productivity of agricultural labor will be less than 100%.

The calculated indices by region during the period of 1978–1998 are shown in Fig. 4. The meaning of the results is twofold. First, the comparative productivity of agricultural labor in the country as a whole has been lower than 100%. Second, the indices in central and western region are typically lower than that in eastern region, suggesting a greater misallocation of labor and capital in the central and west. After the beginning of reform in 1978, the agricultural–industrial productivity gap narrowed, with the greatest reduction in the gap occurring in the eastern region, with the ratio 17.43 percentage points higher in 1998 than in 1978, followed by central region, 10.51 percentage points higher than in 1978, and the western region, which exhibits only a 5.79 percentage points reduction between 1978 and 1998. During the 1990s, especially after mid-1990s, the rapid slowdown of township and village enterprise growth and severe urban resulted in a sharp reduction of the flow of labor out of agriculture and even some reverse migration of labor. This is illustrated in the decrease of the comparative productivity of agricultural labor in the country as a whole, with the decline being most severe in the central and western regions.
A critical variable in analyzing the path of the various regions toward their steady states is Per Capita Income in Starting Years, which is measured by per capita GDP in 1978. Under the assumption of conditional convergence, initial per capita GDP is expected to be negatively correlated to subsequent GDP growth. Human Capital is a main determinant of differences in steady-state GDP across the provinces. Barro (1991) and Chen & Fleisher, 1996 have chose primary school enrollment rate and/or secondary school enrollment rate as the proxy for human capital. Based on availability and reliability of data, we use mean years of school by province from the 1982 population census as our proxy for human capital endowment in the beginning of the reform. As shown in Fig. 5, provinces with the highest initial level of human capital (such as Beijing, Shanghai, Tianjin, and Liaoning) are mostly located in eastern region, while those with the lowest initial levels (such as Tibet, Qinghai, Gansu, Guizhou, and Yunnan) are mainly in the western region.

The Marketization Index is used to examine the effect of market-oriented institutional reforms on economic growth. It is the arithmetic average of the share of total commodity sales by the nonstate sector, the proportion of nonstate fixed capital investment in total investment, the share of nonstate industrial output in the total output, and foreign trade dependence. Government Expenditure Level is the ratio of provincial governments’ consumption expenditure to GDP. We assume (following Barro, 1998 for example) that the government intervention has a negative impact on economic growth. This variable takes on the highest value in the western region and the lowest value in eastern region. There is an upward trend in all three regions. Investment Efficiency is measured by the proportion of fixed capital formation in total capital formation (fixed capital formation+inventory increase), assumed to reflect the efficiency of input and capital markets, and expected to have a positive influence
on growth rate. At the beginning of reform, China’s economy was characterized by widespread shortages enterprises to hoard many input goods. To the extent markets have functioned better under reform, investment will have been directed more toward fixed capital formation, which presumably is productivity enhancing. The Investment Rate is proportion of total capital formation in total GDP. The higher the rate of physical capital formation, the higher is the expected economic growth rate. Before 1990s, the investment rate was highest in the western region. Since 1990, the investment rate has been highest in the eastern region.

Fig. 5. Relationship between economic growth rate and starting human capital in China.


Source: The average growth rates are calculated from the Provincial Data in 50 years of People’s Republic of China. China Statistic Press, 2000; the years of school per capita is calculated from the 1982 National Census.

Wang (2000) uses the similar measure to examine investment efficiency.
The Labor Participation Rate is the share of employed persons in the total population, indicating possible opportunities for economically active population, which we assume is positively correlated with economic growth.

6. Empirical model and results

We construct our empirical regression equation as follows:

\[ y_{i,t} = \alpha_0 + \beta_1 \log(GDP)_{i,0} + \beta_2 \log(HK)_{i,0} + \beta_3 \text{LAB}_{i,t} + \beta_4 \text{RP}_{i,t} + \beta_5 \text{MKT}_{i,t} + \beta_6 \text{INV}_{i,t} \\
+ \beta_7 \text{IE}_{i,t} + \beta_8 \text{GOC}_{i,t} + \varepsilon_{i,t} \]

where the left-hand variable is real annual growth of per capita GDP. The regressors are \( \log(GDP)_{i,0} \) (log per capita GDP province \( i \) in 1978), \( \log(HK)_{i,0} \) (initial human capital represented by log average years of school of province \( i \) in 1982), \( \text{LAB}_{i,t} \) (labor participation rate of province \( i \) in year \( t \)), \( \text{RP}_{i,t} \) (comparative labor productivity of agriculture in province \( i \) in year \( t \)), \( \text{MKT}_{i,t} \) (the marketization index of province \( i \) in year \( t \)), \( \text{INV}_{i,t} \) (the investment rate of province \( i \) in year \( t \)), \( \text{IE}_{i,t} \) (the investment efficiency of province \( i \) in year \( t \)), \( \text{GOC}_{i,t} \) (the government expenditure share of province \( i \) in year \( t \)), and \( \varepsilon_{i,t} \) (the error term).

The estimated results are reported in Table 2. Column 1 shows OLS estimates of the respective regression coefficients. \( R^2 \) is .14, the \( t \) statistics are all at the significant level of 5% or 1%, and the signs of the coefficients are all as hypothesized above. In order to deal with heteroscedasticity and autocorrelation and to improve estimation efficiency, we report

<table>
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<tr>
<th>Table 2</th>
<th>Regression results of testing the conditional convergence in China</th>
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<tr>
<td></td>
<td>OLS</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Starting human capital</td>
<td>2.852 (1.53)</td>
</tr>
<tr>
<td>Labor participation rate</td>
<td>0.131 (3.07)**</td>
</tr>
<tr>
<td>Comparative labor productivity</td>
<td>0.058 (2.01)*</td>
</tr>
<tr>
<td>Comparative labor productivity time period dummy</td>
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</tr>
<tr>
<td>Investment rate</td>
<td>0.086 (3.04)**</td>
</tr>
<tr>
<td>Marketization index</td>
<td>0.061 (3.83)**</td>
</tr>
<tr>
<td>Investment efficiency</td>
<td>0.041 (1.61)</td>
</tr>
<tr>
<td>Government expenditure share</td>
<td>-0.160 (2.99)**</td>
</tr>
<tr>
<td>Time trend</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>9.281 (3.02)**</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>.14</td>
</tr>
<tr>
<td>Observations</td>
<td>580</td>
</tr>
</tbody>
</table>

Absolute value of \( t \) test and \( z \)-test is in parentheses.
* Shows significance at 5% level.
** Shows significance at 1% level.
coefficients estimated by Feasible Generalized Least Squares (FGLS) in Columns 2–4 (Greene, 1993). Below, we discuss the regression results and their implications based mainly on Column 2, which appears to provide the best specification based on the signs and statistical significance of the coefficients.

Firstly, we consider the initial conditions—per capita GDP and human capital endowment in 1978. Controlling for other explanatory variables, the negative relationship between initial per capita GDP and economic growth is negative and significant, consistent with the conditional convergence hypothesis. The estimated coefficient implies that a 1% point higher initial level of per capita GDP is associated with a 3.36% low rate of provincial economic growth, holding other factors constant. Initial human capital stock has a significantly positive impact on economic growth, a 1% increase in years of school being associated with a 4.53% higher growth rate of GDP. Because human capital is a cumulative variable and is an important player in the long-run growth process, our results confirm those of Fleisher and Chen (1997) that investment in education is an important way to reduce regional disparity in China.

Secondly, we examine the impact of the comparative productivity of agricultural labor. In Columns 1–3, the correlation between comparative productivity of agricultural labor and provincial growth rate is positive and statistically significant. In Column 3 where we introduce a time trend variable, the z-test of this variable is not significant. In Eq. (4), we introduce a time period dummy variable, which takes on the value 0 before 1991 and 1 in 1991 and later. The result suggests that the effect of the comparative productivity of agricultural labor is greater and more significant after 1990 than before. It is consistent with the hypothesis that improvements in technical efficiency contributed a relatively strong boost to economic growth before 1990, while improvements of allocative efficiency were relatively more important afterward. The estimated coefficient of the variable measuring comparative productivity of agricultural labor implies that a 1% increase in this variable (after 1990) is associated with an increase in the rate of economic growth of 0.064%.

The estimated coefficients of the three variables representing institutional factors have their expected signs and are reasonably significant. The implications are as follows. (1) The coefficient of the marketization variable implies that a 1% increase in this index is associated with an increased growth rate of 0.05%. (2) Reducing the share of government consumption in GDP expenditure by 1% is associated with an increase in economic growth of 0.09%. (3) A 1% increase in the variable measuring investment efficiency is associated with a growth rate that is 0.051% higher.

Lastly, our results imply an that an increase of 1% in the share of investment in GDP raises annual economic growth by 0.073%. They also imply that an increase in the labor force participation rate of 1% is associated with a 0.164% increase in the growth rate.

7. Conclusion

Our research supports the hypothesis that China’s regional growth can be characterized as a process of conditional convergence. Thus, factors affecting differential growth rates among
regions suggest policies to help lagging provinces catch up with the more developed provinces. Our findings in this paper suggest that labor market distortions affect China’s regional economic growth and cause disparities. Removing obstacles to the development of labor markets will increase growth in lagging regions and help narrow regional gaps. In particular, abolishing of the hukou system is crucial for labor mobility. Also very important, local protectionism has increased labor market segregation. The power of decentralized local governments intended to restrict mobility in order to protect local workers’ job security in the presence of high unemployment risk needs to be controlled. Finally, rural–urban discrepancies in social security protection should be eliminated in order to promote labor market development. We believe that policies such as those recommended will increase growth in the central and western regions and help to narrow interregional inequality.

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References


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