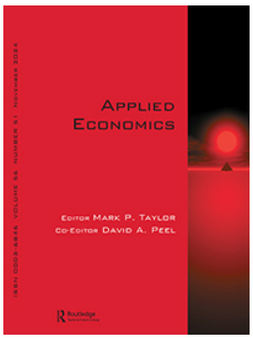

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Convergence of multidimensional poverty in China: does good governance matter?

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ABSTRACT

The existing literature finds the multidimensional poverty may not converge because it usually declines relatively slowly and even shows an upward trend. This paper investigates the convergence of multidimensional poverty and whether good governance could promote it. We examine the impact of good governance on convergence of multidimensional poverty using the matching data of China Family Panel Studies from 2010–2018 with provincial officials. Our results show that the reduction of the multidimensional poverty index is mainly due to a decrease in the multidimensional headcount ratio (H), which decreases more in provinces with higher initial H. However, the speed of convergence varies among provinces and cannot be explained by unconditional convergence alone. Such variation is explained by promotion incentives of officials and fiscal expenditure, specifically, the H tends to decrease faster in provinces with stronger promotion incentives and more fiscal expenditure. Our findings would provide implications for China's future anti-poverty policies and poverty alleviation work in other developing countries.

KEYWORDS

Governance; promotion incentives; multidimensional poverty; convergence; China

JEL CLASSIFICATION

E62; H53; I32

I. Introduction

Multidimensional poverty encompasses not only income but also factors such as access to infrastructure, social benefits, and security, as well as subjective perceptions of these benefits (Sen 1999). Following Alkire and Foster (2011), many scholars have carried out research within or across countries using multidimensional poverty measurement (Alkire and Seth 2015; Alkire, Oldiges, and Kanagaratnam 2021; Alkire, Roche, and Vaz 2017). Previous studies have found that the majority of individuals in the multidimensional poverty are not really in income poverty (Alkire, Oldiges, and Kanagaratnam 2021). While the convergence of income poverty has been confirmed (Asadullah and Savoia 2018; Ouyang, Shimeles, and Thorbecke 2019; Ravallion 2012), the convergence of multidimensional poverty is less certain. Alkire and Seth (2015) found that while income poverty declines relatively quickly, multidimensional poverty declines more slowly and may even increase. The determinants of convergence in multidimensional poverty have not been extensively studied.

Income is the main indicator of living standards and all other social and public factors such as education and health, which are directly associated with the income. Higher is the income level of an individual/household, better he can afford the quality education. However, it is difficult to reduce the multidimensional poverty solely by increasing income. Public service market could not be formed in poverty-stricken areas because of insufficient institutional supplies of public goods such as education, medical and health care (Fiszbein, Kanbur, and Yemtsov 2014; Sanogo 2019). Research on India has shown that areas with higher initial levels of multidimensional poverty experience slower reductions in poverty (Alkire and Seth 2015). Higher initial levels of multidimensional poverty can also lead to lower accumulation of human capital (Baldacci et al. 2008; Gyimah-Brempong and Wilson 2004), which can hinder economic growth and reduce the effectiveness of growth in reducing poverty.

Good governance is the prerequisite for developing countries to receive development assistance from international agencies such as the United Nations Development Program, the World Bank, and the International Monetary Fund (Grindle

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2004, 2007). It is also a key component of the Millennium Development Goals (MDGs) of United Nations. Previous research has examined the impact of good governance on factors such as citizen trust, infant mortality, inclusive growth, and bank intermediary costs (Doumbia 2019; Jarmuzek and Lybek 2020; Tarverdi and Rammohan 2017; Yousaf, Ihsan, and Ellahi 2016).

Some researchers have begun to focus on the influence of good governance on income poverty reduction in recent years (Asadullah and Savoia 2018; Kwon and Kim 2014; Ortega, Casquero, and Sanjuán 2016). Although scholars generally agree on the importance of good governance in poverty reduction, poverty has been reduced in some countries ranking very low in various governance quality indicators, which directly challenges the view that good governance is the prerequisite for poverty reduction (Asadullah, Savoia, and Mahmud 2014; Mcgee 2000). In addition, the effects of good governance on poverty reduction also vary depending on a country's stage of economic development. For example, while good governance reduces poverty in middle-income countries, it has no impact in the least developed countries (Kwon and Kim 2014). Focusing solely on income poverty convergence does not provide a complete picture of poverty reduction or the role of good governance. The impact of good governance on multidimensional poverty has not been extensively studied. Asadullah and Savoia (2018) believe that compared to income-dimension poverty incidence, the multidimensional poverty may converge more slowly and respond more sensitively to governance factors. Thus, the impact of good governance on the convergence of multidimensional poverty is interesting for further research.

China has made significant progress in alleviating poverty over the past 40 years (Liu et al. 2019). The literature on China mainly focuses on the evolution of multidimensional poverty indicators in China and among different populations (Shen and Li 2022; Shen, Alkire, and Zhang 2019). Previous studies believe that China's success in reducing poverty benefits from sustainable pro-poor economic growth, and a series of policies and institutional reforms related to poverty reduction led by the Chinese government (Liu, Guo, and Zhou 2018). However, there is limited empirical evidence to support the idea that China's unique approach to poverty governance has played a significant role, with the exception of Wang and Su (2020).

This paper contributes to the literature on multidimensional poverty convergence and good governance by examining the evolution characteristics of multidimensional poverty among provinces in China from 2010 to 2018 based on data of the Chinese Family Panel Studies matched with Chinese provincial-level officials. The study also explores how China's poverty governance has impacted the convergence of multidimensional poverty. The existing empirical studies on governance and poverty reduction are mostly based on cross-country data and mainly focus on governance dimensions, such as rule of law, political stability, and corruption control (Asadullah and Savoia 2018; Kwon and Kim 2014; Ortega, Casquero, and Sanjuán 2016). Unlike existing empirical studies, this paper focuses on the effects of the special good governance in China, official promotion incentives and fiscal expenditure. In addition, this paper contributes to literature on multidimensional poverty decomposition by decomposing China's multidimensional poverty index from the provincial level and exploring its changing characteristics.

The China Family Panel Studies (CFPS) is used in this study. The CFPS covers 25 provinces/municipalities/autonomous regions and can reflect changes in China's society, economy, population, education and health. The CFPS was first officially conducted in 2010, and 2018 is the latest year available. In 2011, the Chinese government issued the 'Outline for Rural Poverty Alleviation and Development in China (2011–2020)' and began a new round of poverty alleviation and development programmes. Therefore, the period 2010–2018 of CFPS can well reflect China's multidimensional poverty situation in recent years. Existing literature also uses the same sample period to measure China's multidimensional poverty (Zhang, Ma, and Wang 2021).

The paper is structured as follows: Section II outlines the theoretical framework for analysing the relationship between good governance and multidimensional poverty. Section III describes the CFPS and uses data from five periods (2010,

2012, 2014, 2016, and 2018) to measure and decompose multidimensional poverty. Section IV details the methodology used for empirical analysis. Section V presents the results of the analysis. Finally, Section VI concludes the paper.

II. Analysis framework

In order to successfully eliminate poverty by 2020, government agencies at the central level[1] have successively issued relevant poverty reduction policy documents.[2] The above documents pointed out that the central government acts as a coordinator, provincial governments take overall responsibility, and the leading officials of provincial party committees and governments should sign the poverty alleviation written pledges to the central government. One of the prominent characters of poverty governance in China is that there is an evaluation system for poverty alleviation goals and the achievement of poverty alleviation is an essential basis for the comprehensive evaluation of officials. Thus, it motivates local officials to reduce poverty.

The top position at the provincial level is that of the provincial party secretaries, followed immediately by the provincial governors under China's political system. Li and Zhou (2005) shows that the provincial party secretaries and the provincial governors actively respond to the promotion incentives and institutional arrangements set up by the central government in order to obtain political promotion. The increasing in weight of poverty alleviation achievements in the comprehensive evaluation may motivate the provincial party secretaries and the provincial governors to tournament based on achievements of poverty alleviation. In order to increase the possibility of political promotion, the provincial party secretaries and the provincial governors with stronger promotion incentives may adopt the following strategies. Firstly, they may more accurately target the poor, identify the causes of poverty, and make suitable poverty alleviation policies. Secondly, they may more accurately select lower-level officials of poverty alleviation and strengthen the organization, to improve the implementation efficiency of poverty alleviation policies (Wang and Su 2020). As a result, the multidimensional poverty in provinces where officials have stronger promotion incentives would experience a larger reduction. Therefore, the convergence of multidimensional poverty may be more pronounced in provinces with stronger promotion incentives.

Fiscal expenditure is another prominent poverty governance character in China. The multidimensional poverty decreases relatively more in provinces where fiscal expenditure has grown rapidly. For example, fiscal expenditure on education and health care can directly improve the poor's capability, education, and health while expenditure on social security can indirectly improve living conditions, thereby reducing both the degree of deprivation and the multidimensional poverty. Meanwhile, fiscal expenditure on agriculture, forestry, water, and transportation can directly reduce the degree of deprivation in production and living conditions (Liu et al. 2019). Specifically, they can raise the poor population's income through the following ways: increasing productivity of agriculture by reducing the cost of inputs; increasing communication between deep poverty-stricken areas and other areas; and increasing non-agricultural employment opportunities (Fan and Chan-Kang 2008; Njenga and Davis 2003). Therefore, the convergence of multidimensional poverty may be more pronounced in provinces with more fiscal expenditure.

III. Data and multidimensional poverty measurement

Data source

Our analysis draws on data from CFPS, a nationally representative, longitudinal survey of Chinese communities, families and individuals funded by the Chinese government through Peking University in 2010. The CFPS employs a novel rural-urban, integrated, multi-stage probability-proportion-to-size (PPS) sampling scheme with implicit stratification to ensure the validity and

[1]Such as the State Council Leading Group of Poverty Alleviation and Development, the General Office of the Central Committee of the Communist Party of China, and the General Office of the State Council.

[2]Such as the *Evaluation Measures on the Development-driven Poverty Alleviation (Trial), Evaluation Measures on Development-driven Poverty Alleviation by Provincial Party Committees and Governments, Measures for Implementing the Poverty Alleviation Responsibility System.*

representative of its sample. The studies in the CFPS convey a wealth of information that focus on the economic and the non-economic characteristics of the Chinese. Therefore, the CFPS samples are conducive to measuring and analysing multidimensional poverty. The measurement and decomposition of multidimensional poverty in this paper use the CFPS in 2010, 2012, 2014, 2016, and 2018.

Provincial officials' data are collected and sorted manually through the local leadership database of People's Daily Online and Baidu Encyclopedia.[3] The officials who served for more than 6 months in the current year are regarded as the current officials. Provincial macroeconomic data are from the China Statistical Yearbook and the statistical yearbooks of each province. This paper measures multidimensional poverty at the individual level of the sample provinces, and then aggregates them to obtain the multidimensional poverty data of each province. Finally, we match provincial officials' data, provincial macroeconomic data with CFPS data, obtain a five-period panel data.

Multidimensional poverty measurement

We refer to Alkire and Foster (2011) to measure multidimensional poverty. y_{ij} represents the value of individual i on the indicator j. We identify multidimensional poverty through two thresholds indicated by z and k, and define the deprivation matrix g_{ij}. If $y_{ij} < z_j$, then individual i is deprived on indicator j, record as $g_{ij} = 1$.

Assume there are n individuals in the sample, and each individual's well-being is measured by d indicators. Let the weight of each indicator be w_j, $0 < w_j < 1$ and $\sum_{j=1}^{d} w_j = 1$. Next, all study dimensions and indicators within each dimension are weighted equally (Khan and Sloboda 2022), namely,

$$w_j = \frac{1}{no.of\ dumensions} * \frac{1}{no \cdot of\ indicators} \quad (1)$$

Define a column vector $c_i = \sum_{j=1}^{d} w_j g_{ij}$, c_i represents weighted deprivation scores of individual i on d indicators. Let k ($0 < k < 1$) be the critical value of multidimensional poverty. If $c_i \geq k$, then individual i is identified as poor. We denote the number of poor people in the sample by q. Then the share of poor population or the incidence of poverty or the multidimensional headcount ratio (H) is denoted by:

$$H = q/n = \sum_{i=1}^{n} c_i(k)/n. \quad (2)$$

The average deprivation score is given by$A = \sum_{i=1}^{q} c_i(k)/q$, and the multidimensional poverty index (MPI) is given by $MPI = H \times A = \sum_{i=1}^{q} c_i(k)/n$

The majority of existing literature choose education, health and living conditions to measure multidimensional poverty (Alkire and Seth 2015; Alkire, Roche, and Vaz 2017; Shen and Li 2022; Shen, Alkire, and Zhang 2019). Different from the above literature, this paper adds the dimension of social security. Social security is very important to ensure people's capability of basic survival and development. At the same time, China's poverty governance also places special emphasis on giving sufficient social security to poor groups. Therefore, according to the availability of data provided by CFPS, this paper selects four dimensions of education, health, social security, and living conditions to measure multidimensional poverty. Following Alkire, Oldiges, and Kanagaratnam (2021), both four dimensions and the indicators of each dimension are equally weighted. There are only two indicators in each dimension of education, health and social security, thus the indicators of education, health, and social security are each weighted one-eighth each. The living conditions dimension consists of four indicators, so each indicator is weighted one-sixteenth. The specific indicators, deprivation thresholds and weights in each dimension are shown in Table 1.

Table 2 reports MPI and its two components – H and A. At the national level, the MPI dropped from 0.115 in 2010 to 0.105 in 2018, and its absolute change was 0.010, which was statistically significant at the level of 1%, with an average annual decrease of 1.13%. The H decreased from 26.91% in 2010 to 23.51% in 2018, the absolute change was

[3]Baidu Encyclopedia is a free online encyclopaediaencyclopaedia, which aims to create a Chinese knowledge encyclopaediaencyclopaedia covering all fields of knowledge and serving all internet users. Information about officials mainly comes from Baidu encyclopaediaencyclopaedia entries.

Table 1. Calculation of multidimensional poverty.

Dimension	Indicator	Deprivation threshold	Weight
Education	Per capita education years	Family with members aged 16 and above whose education years are less than 9 years	1/8
	Children enrollment rate	Children aged 6 to 16 (including 6 years old) in the family are out of school or drop out	1/8
Health	Height and weight	Family with adults aged 18 and above whose body mass index (BMI) value is less than 18.5kg/m2	1/8
	Health condition	Family members are unhealthy or general health	1/8
Social security	Medical insurance	Family with members aged 6 and above are not covered by medical insurance	1/8
	Employment	Family with members are unemployed	1/8
Living conditions	Cooking fuel	Using non-gas/natural gas/biogas/electricity and other clean fuels to cook	1/16
	Clean drinking water	Domestic drinking water is clean drinking water such as non-tap water/mineral water/purified water/filtered water	1/16
	Assets	No assets	1/16
	Housing condition	Per capita housing area of the family is less than 12m2	1/16

Table 2. Total change in multidimensional poverty nationally and across different provinces subgroups.

	2010			2018			Absolute change		
	H	A	MPI	H	A	MPI	ΔH	ΔA	ΔMPI
National	26.91%	42.90%	0.115	23.51%	44.68%	0.105	-3.40%***	1.78%***	-0.010***
Beijing	7.20%	41.32%	0.030	5.95%	41.67%	0.025	-1.25%	0.35%	-0.005
Tianjin	18.52%	40.25%	0.075	14.17%	41.54%	0.059	-4.35%	1.29%	-0.016
Hebei	20.40%	42.03%	0.086	18.76%	43.60%	0.082	-1.64%*	1.56%***	-0.004
Shanxi	24.32%	45.22%	0.110	21.29%	44.72%	0.095	-3.03%**	-0.50%	-0.015**
Liaoning	25.40%	42.19%	0.107	26.08%	46.06%	0.120	0.67%	3.87%***	0.013***
Jilin	29.94%	43.26%	0.130	29.59%	45.58%	0.135	-0.35%	2.32%***	0.005
Heilongjiang	23.07%	44.21%	0.102	23.48%	44.51%	0.104	0.40%	0.29%	0.002
Shanghai	14.44%	41.59%	0.060	17.13%	42.56%	0.073	2.68%***	0.97%**	0.013***
Jiangsu	17.59%	41.47%	0.073	15.44%	41.32%	0.064	-2.14%	-0.15%	-0.009
Zhejiang	12.66%	41.38%	0.052	15.61%	42.70%	0.067	2.95%*	1.32%	0.014**
Anhui	33.13%	41.33%	0.137	24.80%	44.64%	0.111	-8.34%***	3.31%***	-0.026***
Fujian	27.65%	43.75%	0.121	27.12%	42.73%	0.116	-0.54%	-1.02%	-.005
Jiangxi	29.52%	43.16%	0.127	31.34%	45.12%	0.141	1.82%	1.96%***	0.014*
Shandong	21.23%	41.53%	0.088	21.27%	44.09%	0.094	0.04%	2.56%***	0.006
Henan	26.65%	42.37%	0.113	18.71%	43.96%	0.082	-7.94%***	1.59%***	-0.031***
Hubei	18.37%	41.30%	0.076	18.89%	42.46%	0.080	0.52%	1.16%*	0.004
Hunan	21.73%	42.83%	0.093	18.12%	44.76%	0.081	-3.61%**	1.93%***	-0.012*
Guangdong	26.15%	43.49%	0.114	23.40%	44.84%	0.105	-2.76%***	1.35%***	-0.009**
Guangxi	33.62%	45.11%	0.152	24.80%	45.90%	0.114	-8.82%***	0.80%	-0.038***
Chongqing	41.40%	42.18%	0.175	28.31%	43.46%	0.123	-13.09%***	1.28%*	-0.052***
Sichuan	42.55%	42.49%	0.181	31.27%	45.42%	0.142	-11.28%***	2.93%***	-0.039***
Guizhou	36.23%	44.82%	0.162	29.05%	43.96%	0.128	-7.18%***	-0.86%*	-0.035***
Yunnan	30.02%	42.23%	0.127	23.23%	43.11%	0.100	-6.80%***	0.87%*	-0.027***
Shaanxi	20.71%	42.23%	0.087	21.37%	45.64%	0.098	0.66%	3.41%***	0.010
Gansu	37.58%	43.25%	0.163	30.67%	45.55%	0.140	-6.90%***	2.30%***	-0.023***
Eastern	21.31%	42.39%	0.090	21.02%	44.42%	0.093	-0.29%	2.03%***	0.003*
Central	25.68%	43.02%	0.110	21.43%	44.43%	0.095	-4.25%***	1.41%***	-0.015***
Western	36.15%	43.23%	0.156	28.66%	45.10%	0.129	-7.49%***	1.86%***	-0.027***

The statistical significance of the change adopts the t-statistic one-tailed test. *, **, and *** indicate significance at the 10%, 5%, and 1% respectively. Because the numbers after the decimal point are rounded, the product of H times A may not be exactly equal to MPI.

3.40%, which was statistically significant at the level of 1%, with an average annual decrease of 1.67%. The A rose from 42.90% in 2010 to 44.68% in 2018, the absolute change was 1.78%, which was statistically significant at the level of 1%, with an average annual increase of 0.51%. The above analyses show that from national perspective, the H in China declines from 2010 to 2018, but the A has an upward trend; the decline of the MPI is mainly driven by the decline in the H.

In order to explore the evolution characteristics of multidimensional poverty in different provinces from 2010 to 2018, this paper further decomposes multidimensional poverty at the national level by province. It can be seen that the evolution characteristics of multidimensional poverty in different provinces are different from those of the national level in Table 2.

The MPI in 11[4] out of 25 provinces dropped significantly. The MPI in Liaoning, Shanghai,

[4]Shanxi, Anhui, Henan, Hunan, Guangdong, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, and Gansu。.

Zhejiang, and Jiangxi increased significantly, while the remaining 10 provinces (cities) did not experience significant changes. The H in 12[5] out of 25 provinces has significantly decreased, but it has increased significantly in Shanghai and Zhejiang, while the remaining 11 provinces have not changed significantly. In terms of the A, only the A in Guizhou out of 25 provinces dropped from 44.82% in 2010 to 43.96% in 2018 at the statistical level of 10%. Specific to the three major regional levels of East, Central, and West,[6] both MPI and A in the eastern region show a significant upward trend, and the change in the H is insignificant. The H and MPI in the central and western regions both show a significant downward trend, and the decline in western region is relatively large, while the A shows a significant upward trend.

In general, H declined relatively sharply from 2010 to 2018 in the central and western provinces with a relatively higher initial value. Although the H in some provinces has dropped significantly, the A has increased significantly, which indicates that the previous decline of the MPI was achieved more by urging the multidimensional poverty population on the edge of threshold to cross the threshold rather than improving the deprivation status of the deeply multidimensional poverty population. The above multidimensional poverty evolution characteristics show that China's multidimensional poverty governance should not only strive to reduce the H, but also focus on reducing A in the future.

Figure 1 is a scatter plot of the relationship between the absolute change of H in various provinces in China from 2010 to 2018 and its initial value in 2010. The H in provinces with a higher initial value in 2010 decreased relatively more, which indicates that the H across Chinese provinces may show absolute convergence. Provinces with a higher initial H are expected to catch up with provinces with a lower initial H. However, whether this convergence process is significant requires testing by regression estimation.

IV. Methodology

Referring to Asadullah and Savoia (2018), we test the convergence of the multidimensional

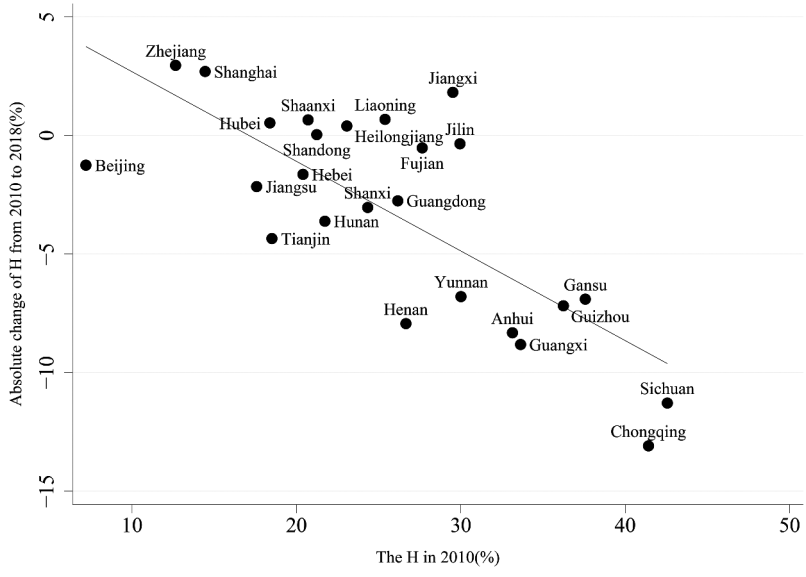

Figure 1. Absolute change of H from 2010 to 2018 and H in 2010 in each province.

[5]Hebei, Shanxi, Anhui, Henan, Hunan, Guangdong, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, and Gansu。.

[6]According to the classification of China's economic regions by the National Bureau of Statistics of China, in this sample, the mid-eastern regions include 10 provinces (cities), which are Beijing, Tianjin, Liaoning, Hebei, Shandong, Shanghai, Jiangsu, Zhejiang, Fujian, and Guangdong. The central regions include 8 provinces, which are Jilin, Heilongjiang, Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan. The western region includes 7 provinces, which are Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi and Gansu.

headcount ratio across Chinese provinces based on the β convergence. The corresponding test, in its simplest form, is absolute β convergence based on cross-sectional data for 2010 and 2018, capturing whether the multidimensional headcount ratio has faster reduction in provinces with higher initial value, and so tend to "catch up", under different initial conditions. The formula is:

$$\Delta H_{it} = \gamma_0 + \gamma_1 H_{i0} + \varepsilon_{it} \quad (3)$$

Where ΔH_{it} is the difference of the multidimensional headcount ratio of each province between 2018 and 2010. H_{i0} is the multidimensional headcount ratio of each province in 2010. γ_0 and γ_1 are the parameters to be estimated. ε_{it} is random disturbance item. A negative estimate of the parameter $\gamma_1$implies that there is unconditional convergence of the multidimensional headcount ratio, namely, provinces with higher initial H tend to experience larger absolute reductions in H and so catch up with provinces with lower initial H independently on their initial conditions.

We further investigate whether good governance would accelerate the convergence of H based on conditional β convergence, and the regression is:

$$\begin{aligned} ln(H_{it+1}/H_{it}) = {} & \lambda_0 + \lambda_1 H_{it} + \lambda_2 Incentive_{it} \\ & + \lambda_3 Incentive_{it} * H + \lambda_4 Fiscal_{it} \\ & + \lambda_5 Fiscal_{it} * H + Z_{it}\eta + \mu_i + \theta_t + \varepsilon_{it} \end{aligned} \quad (4)$$

Where H_{it} and H_{it+1} respectively represent the H of province i in the year of t and t+1, so $ln(H_{it+1}/H_{it})$ measures the change of H of province i over a time span of year $t \sim t+1$. $Incentive_{it}$ and $Fiscal_{it}$ respectively represent promotion incentives of officials and fiscal expenditure in province i in the year of t.Z_{it}represents the control variables that affects the change in the H. μ_i and θ_t are the province fixed effects and the year fixed effects, respectively. ε_{it} is random disturbance item, and λ_0、λ_1、λ_2、λ_3、λ_4、λ_5、η are the parameters to be estimated.

China has a mandatory retirement system in place for its official management. Provincial officials have an age threshold for promotion, and once they exceed this age, their chances of promotion decrease rapidly. The impact of age on the promotion incentives of Chinese officials is well established in the literature. Yu, Zhou, and Zhu (2016) found that while local leaders compete with their peers for economic growth, the likelihood of promotion decreases with age due to mandatory retirement. Similarly, Yin and Wu (2022) used the age of municipal party secretaries as a proxy for official promotion when studying the relationship between promotion incentives and environmental pollution.

According to Chinese practice, the provincial party secretaries are generally regarded as the 'top leader' and make the final decision on all aspects in the province. As such, we select the age of the provincial party secretary (*S_age*) as a proxy variable for officials' promotion incentives (Li and Zhou 2005). Fiscal expenditure is measured by the ratio of local expenditure on education, medical care, family planning, social security, employment, agriculture, forestry, water affairs, and transportation to general public budget expenditure. Promotion incentives decrease as age increases. Therefore, if λ_3 is positive, it suggests that an increase in age inhibits convergence of the H. If λ_5 is positive, it suggests that an increase in fiscal expenditure promotes convergence of the H.

Based on related literature (Cepparulo, Cuestas, and Intartaglia 2017; Montalvo and Ravallion 2010; Rewilak 2017; Tsai and Huang 2007), the control variables are as follows: (1) Economic growth, measured by the natural logarithm of the per capita GDP in the jurisdiction; (2) Industrialization, measured by the ratio of secondary industry added value to GDP; (3) Industrial structure, measured by the ratio of tertiary industry added value to GDP; (4) Openness, measured by the ratio of foreign direct investment utilization in the jurisdiction to GDP; (5) Financial development, measured by the ratio of loan balances to deposit balances in financial institutions within the jurisdiction. Table 3 presents descriptive statistics of the variables.

V. Empirical results

Are differences in the H among provinces narrowing?

Table 4 presents the results of absolute β convergence of Equation (3). When k is set to 1/3, as shown in Column (1), the coefficient for H in

Table 3. Variables and descriptive statistics.

Variable	Description	N	Mean	SD
MPI	Multidimensional poverty index	125	0.107	0.032
A	Average deprivation score	125	44.103	1.656
H	Multidimensional poverty headcount ratio	125	24.088	6.956
S_age	Age of provincial party secretary	125	60.744	4.016
Fiscal	(Education, medical care and family planning, social security and employment, agriculture, forestry and water affairs, transportation expenditure/general public budget expenditure) ×100	125	54.124	6.383
Economic growth	Natural logarithm of per capita GDP	125	10.708	0.482
Industrialization	(The added value of the secondary industry/GDP) ×100	125	45.344	7.964
Industrial structure	(The added value of the tertiary industry/GDP) ×100	125	45.424	10.080
Openness	(Actual utilization of foreign direct investment/GDP) ×100	125	32.867	52.122
Financial	Various loan balances of financial institutions/deposit balances of financial institutions	125	0.736	0.123

Table 4. Estimation for absoluteβ convergence of H.

Variable	(1) $k = 1/3$	(2) $k = 1/2$	(3) $k = 1/4$	(4) $k = 1/3$	(5) $k = 1/2$	(6) $k = 1/4$
H in 2010	-0.378***	-0.424***	-0.181***			
	(0.070)	(0.126)	(0.045)			
Logarithm of H in 2010				-0.030*	-0.024**	-0.012**
				(0.015)	(0.009)	(0.006)
Constant term	6.471***	3.125***	3.557	0.062**	0.061*	0.034
	(1.886)	(0.944)	(2.238)	(0.028)	(0.030)	(0.021)
F-stat	29.35***	11.29***	16.23***	6.45**	4.05*	5.05**
R-squared	0.561	0.329	0.414	0.150	0.219	0.180
Observations	25	25	25	25	25	25

Standard errors are in parentheses. *, **, and *** indicate significant at the statistical levels of 10%, 5%, and 1%, respectively.

2010 is significantly negative at the 1% level. Columns (2) and (3) display the results when k is set to 1/2 and 1/4, respectively. Despite changes in the coefficient for H in 2010, it remains significantly negative at the 1% level. This indicates that since 2010, there has been absolute convergence of H across Chinese provinces.

This paper conducts a robustness test to examine the decline rate of the H. Following Ravallion (2012), the dependent variable is the average annual decline rate of H in all provinces from 2010 to 2018,[7] while the independent variable is the logarithm of the H in each province in 2010. Columns (4), (5), and (6) show the results when k is set to 1/3, 1/2, and 1/4, respectively. The results show that the coefficient of logarithmic of the H in 2010 is significantly negative at least at the level of 10%. This suggests that since 2010, provinces with initially higher H have experienced relatively faster declines in H. In other words, there has been an absolute convergence of H across Chinese provinces.

To better understand the rate at which the H converges, we take Guizhou and Hebei, which are basically on the regression line when the k is 1/3, for analysis. In 2010, the H in Guizhou and Hebei was 36.23% and 20.40%, respectively. According to Column (1) in Table 4, from 2010 to 2018, the H in Guizhou and Hebei decreased by 7.18% and 1.64%, respectively, with an average annual decline of 0.90% and 0.21%, respectively. Based on the current multidimensional poverty measurement method and the rate of decline in the H in this study, it is estimated that by the end of 2020, the H in Guizhou and Hebei would drop to 27.25% and 18.34%, respectively.

While both China and India have many provincial-level administrative regions with higher initial H, but the evolution of the H differs between provinces in China and states in India. In China, provinces with higher H in 2010 experienced a greater decline in H from 2010 to 2018. However, in India, states with higher H in 1994 experienced a smaller decline in H from 1994 to 2005 (Alkire and Seth 2015). Moreover, unconditional convergence could not explain the substantial variation speed of convergence in H among provinces.

[7]Approximately measured by the difference between logarithmic values of the multidimensional poverty headcount ratio in 2018 and 2010 divided by 8, In line with Ouyang, Shimeles, and Thorbecke (2019).

The impact of good governance on convergence of H

It's important to note that our study does not directly compare changes in H between provinces in China and other developing countries, including India. Both China and other developing countries have many provincial-level administrative regions with higher initial H, which is a similarity between China and other developing countries. The differences lie in the fact that the H in provinces with higher initial H have a relatively greater decline in China, but the H in provinces with higher initial H maybe have a relatively smaller decline in other developing countries (such as the situation in India). We conjecture that the differences may be due to China's adoption of more effective multidimensional poverty governance measures to motivate provinces with higher initial H to actively reduce H. Therefore, we examine the impact of promotion incentives for officials and fiscal expenditure, two aspects of China's poverty governance, on the convergence of H. The results are presented in Table 5.

Column (1) of Table 5 shows that the coefficient in front of the initial H is significantly negative at the 1% level and that the goodness of fit in regression estimation is greatly improved compared to Table 4. This indicates that conditional convergence has stronger explanatory power for changes in H among Chinese provinces.

The positive and statistically significant coefficient of S_age at the 5% level suggests that provinces with younger provincial party secretaries experience a faster decrease in H. This may be due to China's official management system, which sets an age threshold for the promotion of provincial officials. Once this threshold is exceeded, the likelihood of promotion declines rapidly. Compared with younger provincial party secretaries, older provincial party secretaries are more likely to resign from the leading post or retire directly after their term ends. In this situation, although the central government has established an accountability system for poverty alleviation and made the achievement of poverty alleviation as one of the bases for promotion, it is unlikely for them to respond strongly to promotion incentives based on poverty alleviation achievements. While they still respond, the intensity of the response may drop significantly. This would lead to a sharp fall in efficiency of making and implementing poverty alleviation policies. In contrast, younger provincial party secretaries have higher promotion incentives and are more likely to accurately target the poor, identify causes of poverty, make suitable policies, and improve implementation efficiency. This leads to a larger reduction in H in provinces with younger provincial party secretaries.

The negative and statistically significant coefficient of the interaction term between H in 2010 and S_age at the 10% level suggests that higher initial H encourages provincial party secretaries to commit to reducing H. This is because promotion in poverty alleviation depends on the magnitude of H reduction rather than its level. When initial H is low, it is more difficult to further reduce it, making it harder for provincial party

Table 5. The impact of good governance on convergence of H.

Variable	(1)	(2)
H in 2010	-1.031***(0.059)	-1.087***(0.075)
S_age	0.178**(0.081)	0.185**(0.083)
H in 2010×S_age	-0.019(0.011)	-0.021*(0.011)
Fiscal expenditure	-0.201**(0.096)	-0.215**(0.094)
H in 2010× Fiscal expenditure	-0.009*(0.005)	-0.009*(0.005)
Economic growth		-2.152(3.272)
Industrialization		-0.147(0.284)
Industrial structure		-0.180(0.276)
Openness		-0.011(0.016)
Financial development		1.047(2.851)
Constant	2.069***(0.549)	38.538(39.700)
Time fixed effect	control	control
Individual fixed effect	control	control
Observations	100	100
R-squared	0.866	0.866

Robust standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1%, respectively. We used panel data with a lag of one period for estimation, so the sample size was 100 not 125.

secretaries to gain an advantage in poverty alleviation competition. In contrast, when initial H is high, better formulation and implementation of policies can lead to a sharp decline in H, providing an advantage in competition and enabling political promotion. As a result, differences in the ages of provincial party secretaries are an important factor in the variations in convergence speed of H in provinces with similar initial H. These findings support the central government's emphasis on the youth of poverty alleviation officials and their dispatch to poverty-stricken areas in recent years.

The estimated results in column (2) show that fiscal expenditure has a negative impact on the H, with a coefficient of -0.215 that is significant at the 10% level. This means that provinces with higher fiscal expenditure tend to have a faster decrease in H. This could be due to increased availability of public services and improved living conditions resulting from fiscal expenditure on areas such as education, health care, social security, agriculture, forestry, water affairs, and transportation. Moreover, the coefficient of the interaction term between fiscal expenditure and the H in 2010 is -0.009, and is statistically significant at the 10% level. This suggests that the effectiveness of fiscal expenditure in reducing the H is greater for provinces with higher initial H. This could be because the marginal improvement of fiscal expenditure in reducing the H is greater for those with higher initial H. For example, when residents have higher levels of deprivation in indicators such as education level, physical health, and participation in social insurance, that is, when the H is high, the increase in fiscal expenditure would have a large marginal reduction effect on the above indicators. This can push more residents to cross the deprivation cut-off in the above indicators and greatly reduce the H. On the contrary, if residents have lower degree of deprivation in above indicators, that is, when the H is low, the increase of the fiscal expenditure with the same level can only push a small number of residents to cross the deprivation cut-off and reduce the H to a lesser extent. Overall, this suggests that increased fiscal expenditure by the central government has helped provinces with higher initial H converge towards those with lower initial H.

Robustness test

This paper carries out the following robustness tests. Firstly, the age of provincial governors (G_age) instead of provincial party secretaries is used as a proxy for promotion incentives. This is because the central government pointed out that the achievement of poverty alleviation is an essential basis for the comprehensive evaluation of the leading officials of provincial party committees and governments. As the head of the provincial government, the governor is responsible for overseeing all aspects of the government's work, including poverty alleviation efforts. Under China's political system, the power of provincial governors is second only to that of provincial party secretaries. The results of this test are shown in column (1) of Table 6. The coefficient for G_age is positive and significant at the 10% level. The coefficients for the interaction between the H in 2010 and G_age, as well as between the H in 2010 and fiscal expenditure are both negative and significant at the 1% level. Although the coefficient for the interaction between the H in 2010 and fiscal expenditure is not significant, it has the expected sign direction. These results are generally consistent with those shown in column (2) of Table 5.

Secondly, we have excluded the sample of municipalities from our analysis. The three municipalities of Beijing, Shanghai, and Tianjin have relatively high levels of economic development and urbanization, and relatively low levels of H. Additionally, the municipal party secretaries of these municipalities are members of the political bureau of the Central Committee of the Communist Party of China, and their political status is at its peak. As such, their political promotion is unlikely to be affected by the accountability system for poverty alleviation goals. To reduce the impact of these municipal samples on our results, we have performed a regression using a sample that excludes these three municipalities. The results in column (2) of Table 6 show that the coefficient of S_age is positive and significant at the 10% level, while the interaction term between H in 2010 and S_age is negative and significant at the 10% level. Both the coefficients of fiscal expenditure and its interaction term are negative and significant at the 1% level.

Table 6. Robust test.

Variable	(1) $k = 1/3$	(2) $k = 1/3$	(3) $k = 1/2$
H in 2010	-1.011***	-1.022***	-1.036***
	(0.082)	(0.079)	(0.121)
H in 2010 ×Fiscal	-0.006	-0.009*	-0.035***
	(0.005)	(0.005)	(0.008)
Fiscal expenditure	-0.301***	-0.167*	-0.008
	(0.094)	(0.081)	(0.070)
G_age	0.107*		
	(0.059)		
H in 2010 ×age of G_age	-0.026***		
	(0.006)		
S_age		0.189*	0.173***
		(0.092)	(0.040)
H in 2010 ×age of S_age		-0.018*	-0.029*
		(0.010)	(0.015)
Constant	50.888	23.550	41.174
	(45.475)	(37.454)	(28.835)
Control variables	control	control	control
Time fixed effect	control	control	control
Individual fixed effect	control	control	control
Observations	100	88	100
R-squared	0.869	0.881	0.890

Robust standard errors are in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1%, respectively. We used panel data with a lag of one period for estimation, so the sample size was 100 not 125.

Thirdly, we used a higher multidimensional poverty cut-off of k = 1/2 instead of k = 1/3 to measure H and perform regression. While H is relatively low when using k = 1/2 compared to k = 1/3, this change does not affect the distribution of H among provinces. The results in column (3) of Table 6 show that the coefficient of the age of provincial party secretaries is positive and significant at the 1% level. The interaction term between H in 2010 and S_age is negative and significant at the 10% level, and the interaction term between H and fiscal expenditure is negative and significant at the 1% level. Although the coefficient of fiscal expenditure is not significant, it has the expected sign direction, which is consistent with the results in column (2) of Table 5.

VI. Concluding remarks

This paper examines China's multidimensional poverty from 2010 to 2018 using panel data from 25 provinces. It calculates and decomposes China's poverty and investigates the impact of poverty governance, including officials' promotion incentives and fiscal expenditure, on the convergence of the H. The results show that the MPI has evolved differently among provinces. Provinces with higher H in 2010 saw a larger decline in H from 2010 to 2018. While H decreased significantly in some provinces, the average deprivation degree of the multidimensional poverty population increased. The decline of MPI is mainly driven by the decline of H. The H shows unconditional convergence at the national level from 2010 to 2018, with higher initial H provinces seeing a greater decrease. However, this does not explain the variation in convergence speed among provinces. So, we investigate the role of China's poverty governance. The study finds that increased fiscal expenditure reduces H and promotes convergence. The decline of promotion incentives for elder officials restrains the decline of H and reduces the effectiveness of fiscal expenditure in reducing H. The rise of promotion incentives for initially higher H alleviates adverse effects.

This paper provides empirical evidences on the convergence of the H in China, including both unconditional convergence and conditional convergence. Although the convergence of income poverty has been confirmed (Asadullah and Savoia 2018; Ouyang, Shimeles, and Thorbecke 2019; Ravallion 2012), the convergence of the H has not yet been aroused enough attention. This paper finds that, provinces with a higher initial H in China experienced a greater decrease in H while Alkire and Seth (2015) found that states with initially higher H in India experienced a slower decline in H. Furthermore, this paper

contributes to the literature on good governance and poverty reduction. While good governance is a focus of many international institutions in achieving the MDGs, existing research has primarily focused on its impact on income poverty reduction (Asadullah and Savoia 2018; Cingolani, Thomsson, and Crombrugghe 2015; Kwon and Kim 2014). This paper shows that China's poverty governance pattern – officials' promotion incentives and fiscal expenditure – promotes the convergence of the H.

It is noteworthy that the core aspect of China's poverty governance mode is its political centralization, that is, the higher-level government determines the promotion of local officials. The findings of this paper have certain policy implications for other centralized countries or developing countries. For example, the central governments in other developing countries could specify poverty indicators and include the completion of poverty indicators in the comprehensive evaluation of local officials, thereby stimulate local officials to better commit to poverty reduction. In addition, the developing countries should also pay more attention to fiscal expenditure, which plays a crucial role in reducing poverty.

This paper has limitations and directions for future research. In fact, since the poverty alleviation goal is most apparent at the county-level government level, it would be deal to use the county-level data of China's poor counties to study poverty governance through the perspective of promotion incentives and fiscal expenditure. However, due to the unavailability of county-level data for measuring multidimensional poverty, this study is unable to discuss poverty governance in China in greater detail. For instance, the effect of official promotion incentives and fiscal expenditure on multidimensional poverty may differ based on the characteristics of the officials' counties, which requires further investigation.

Despite the Chinese government declared that absolute poverty had been eradicated, both the consolidation of poverty alleviation achievements and the responsibilities of local party committees and governments still have been emphasized in rural revitalization, the focus of rural work in China since 2020. As long as local party committees and governments still should play first responsible role in the rural revitalization, current situation of China is also similar to the sample period of 2010–2018 studied in this paper and the conclusions still works. In addition, longer sample periods are needed in the future to better understand the relationship between poverty governance and poverty reduction.

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