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Income inequality and human capital allocation

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ABSTRACT

This study discusses the relationship between income inequality and human capital allocation in China. We categorise income inequality into intersectoral (state- versus non-state owned) and intergenerational income inequality. Based on relevant theoretical assumptions and empirical tests using existing regional data, we find that income inequality influences regional human capital allocation in China in three ways. First, intersectoral income inequality has a negative impact on regional human capital mismatch (i.e., inconsistency between job skill requirements and workers' actual skills). Second, intergenerational income inequality positively affects regional human capital mismatch. Third, the interaction of intersectoral and intergenerational income inequality has a negative impact on human capital mismatch. Thus, we observe differences in the net impact of intersectoral and intergenerational income inequality on human capital mismatch in China. The net impact of intersectoral income inequality on human capital mismatch is persistently negative, while the impact of intergenerational income inequality on human capital mismatch is contingent upon the degree of regional intersectoral income inequality. However, the imbalance in China's regional development creates discrepancies in the relationship between improvement in income equality across regions and optimisation of human capital allocation. Thus, the process of formulating relevant policies must be regional, long-term based, and phased.

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1. Introduction

In October 2020 in China, the Fifth Plenum of the 19th Central Committee of the Communist Party of China approved the 14th Five-Year Plan for National Economic and Social Development, proposing long-term targets for 'more full and high-quality employment' and a 'significantly improved distribution structure'. With this, China has entered a new stage of improved growth, efficiency, and greater equality. However, human capital is centralised in state-owned sectors (Ge & Li, 2019), indicating that China's economic outcomes may deviate from this desired path, thereby creating an adverse impact on growth (Fleisher et al., 2010; Li & Nan, 2019). The

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excessive distribution of human capital in state-owned sectors is a manifestation of human capital mismatch (i.e., inconsistencies between job skill requirements and workers' actual skills). In addition, excessive human capital flow into state-owned sectors aggravates rent-seeking behaviour in the employment process (Ma et al., 2017), damaging intergenerational class mobility and improvement in income equality. The current excessive allocation of human capital in state-owned sectors is hindering growth efficiency and equality in China. To analyse and clarify this situation, in-depth research is required to investigate the internal link between human capital allocation and income equality. Moreover, this has emerged as an urgent task for improving both growth efficiency and income equality in China. This study addresses the following three questions: (1) Is there an internal relationship between income inequality and human capital mismatch in China? (2) Does the relationship between these two dimensions align or conflict? (3) What is the significance of this relationship for China's social development?

Equity and economic efficiency can be linked to the optimal allocation of human capital. Based on this view, several existing studies discuss the causes and economic impact of excessive allocation of human capital in state-owned sectors. Scholars have indicated that the wage premium in state-owned sectors has led to the trend of excessive allocation of human capital in China's state-owned sectors, and this seems to hinder economic development. However, current research does not provide complete and direct empirical evidence to clarify how this principle operates. In fact, existing studies have also examined the impact of intergenerational income inequality on workers' employment behaviour. However, it is unclear if there is an inevitable association between this impact and economic development, or the mechanism that creates this impact. From the perspective of income inequality, wage premium is a manifestation of intersectoral income inequality in state-owned sectors, while the impact of parents' class on their children's income refers to intergenerational income inequality. Both dimensions affect workers' employment and allocation of human capital. As human capital allocation is a critical factor that determines economic development, both intersectoral and intergenerational income inequality are likely to have a common impact on economic development. However, existing studies have not examined this aspect. Therefore, considering intersectoral and intergenerational income inequality as the basis for our analysis, we examine the outcome of the impact of income inequality on human capital allocation, alongside other underlying mechanisms.

The main contributions of this study are as follows. First, from the perspective of state-owned sectors, we present a theoretical discussion and empirical research on the relationship between income inequality and human capital allocation based on the two dimensions of intersectoral and intergenerational income inequality, thereby enriching research on the relationship between 'equity' and 'efficiency' in economic development. Second, in terms of research methods, to include non-monetary income, we use the individual's social class as a measurement unit of income and construct an income index of 'wage premium in state-owned sectors', thereby, extending the measurement methods of labour income. Third, we find that the direct and net impact of intersectoral income inequality on human capital mismatch is invariably negative, which differs from the inferences made in some previous studies.

The rest of the paper is organised as follows. Section 2 reviews the relevant literature on the relationship between income inequality and human capital allocation. Section 3 proposes the three research hypotheses. Section 4 introduces the empirical model, variables, and relevant data. Section 5 presents the results of our empirical analysis. Section 6 expounds the main conclusions and suggests relevant policy implications.

2. Literature review

Several studies have investigated the relationship between equality and efficiency from the perspective of economic growth, but the reported conclusions are debatable. Some scholars argue that income inequality has an adverse effect on economic growth (Benjamin et al., 2011; Younsi & Bechtini, 2020). Others hold the view that income inequality boosts economic growth (Berg et al., 2018). Some also indicate that the relationship between income inequality and economic growth is contingent upon the level of economic development (Assa, 2012; Brida et al., 2020; Brueckner & Lederman, 2018; Foellmi & Zweimüller, 2017; Marrero & Rodríguez, 2013).

As an important bridge connecting income equality and growth, human capital influences efficiency and plays an important role in economic growth. Fukao et al. (2021) find that growth in human capital quality has contributed 37% towards Japan's labour productivity growth over the past 130 years. However, human capital is also an important channel for income inequality. The impact of parental income advantage can be transferred to children through educational opportunities and returns (Almeida et al., 2022; Hu, 2021). Therefore, some studies have focused on the mechanism between equality and efficiency from the perspective of human capital. For example, many scholars believe that equality, which is facilitated through efficiency, is realised through the accumulation of human capital (Castelló-Climent & Doménech, 2021; Hu, 2021; Kearney & Levine, 2016; Laajaj et al., 2022) and improvement in human capital allocation (Galor & Tsiddon, 1996). However, other studies hold a different view that income inequality first promotes human capital accumulation and subsequently contributes to the improvement of economic efficiency (Moyo et al., 2022). Scholars also believe that the difference between the two views can be attributed to the neglect of certain economic factors in these studies (Bagdadli et al., 2021).

Existing studies also discuss the relationship between income inequality and human capital allocation. Some focused on the perspective of excessive allocation of human capital in China's state-owned sectors based on the country's current national conditions. A dominant notion is that human capital price distortions caused by administrative monopoly is the main cause for human capital mismatch in the state-owned and non-state-owned sectors (Chen et al., 2016; Opp et al., 2014). Jin et al. (2015) consider that administrative monopoly is the consequence of governments' administrative power and the monopoly of state-owned enterprises. State-owned sectors wield their administrative privileges of resource domination and non-market approaches to achieve excessive profits. These are converted into 'high wages' at owners' absence, leading to wage premiums in state-owned sectors (Ye et al., 2011). This causes intersectoral income inequality and varying returns on human capital. Thus, human capital flows into state-owned sectors and triggers excessive distribution in these sectors (Xue & Xin, 2015). In addition, intersectoral differences and generational factors affect return on human capital. According to Rothstein (2019), intergenerational transmission factors explain 40% of the workforce income. Intergenerational transmission theory maintains that parents' distinct backgrounds account for the significant difference in returns on human capital for people belonging to various classes. Moreover, this difference is partially represented in income after different individuals are employed, thus indicating that return on human capital in low-income families is much lower compared to that in high-income families (Kearney & Levine, 2016; Li et al., 2014). This can also be represented by employment, implying that individuals with privileged parents can be recruited into state-owned enterprises and become more easily involved in high-income careers (Ma et al., 2018; Walder & Hu, 2009). This is also reflected in career development, as individuals with privileged parents can obtain better promotional and growth opportunities in their careers (Lin & Zhou, 2019). This forms intergenerational income inequality among workers and changes their income expectations. Based on prospect theory, changes in workers' income expectations modify their employment choices (Orrenius & Zavodny, 2009), further affecting the intersectoral human capital structure.

3. Research hypothesis

3.1. Income inequality in the state-owned sector

This study examines income inequality from two perspectives: intersectoral and intergenerational. Intersectoral income inequality is reflected in the wage premium in China's state-owned sectors, whereas intergenerational income inequality is reflected in the income gap of workers with parents in different classes. The return on human capital for people working in the state-owned sector is significantly higher compared to those employed in non-state sectors, as reflected by the wage premium in state-owned sectors (Jin et al., 2015). Differences in parental background create income differences across classes. In terms of employment, the return on human capital for workers with parents in a superior class is significantly higher than that for people without such an advantage (Lin & Zhou, 2019). The wage premium and income inequality from parents' class form intersectoral and intergenerational income inequality, respectively. From the perspective of returns on human capital, intersectoral and intergenerational income inequality induce the following relationships, respectively:

$$Rs1>Rs0>0 \tag{1}$$

$$Rp0>Rp1>0 \tag{2}$$

where R represents income; s1 and s0 represent state-owned and non-state-owned sectors, respectively; and p1 and p0 represent parents in a vulnerable class and parents in a superior class, respectively. Equation (1) reflects intersectoral income inequality, and equation (2) reflects intergenerational income inequality. When parents are in different classes, there are significant differences in workers wage premiums in the state-owned sector.

3.2. Intersectoral income inequality, intergenerational income inequality and human capital allocation

We consider the level of human capital mismatch as a measure of human capital allocation. The level of mismatch captures the discrepancy between the demanded job skills and workers' actual skills. There are two main reasons for human capital mismatch at the macro level: (i) when the total number of workers with certain skills is insufficient or excessive (Ahsan & Haque, 2017); and (ii) when workers fail to be matched with jobs consistent with their skill levels (Xu & Yu, 2020). With the current momentum in China's economic development, these two phenomena are leading to significant human capital mismatch.

First, there is a serious shortage of higher human capital (i.e., human capital with higher education) in China's labour market (Liu et al., 2018). At the same time, overallocation of human capital in state-owned sectors is attributable to intersectoral income inequality (wage premiums), which attracts workers to the state-owned sector (Sheng et al., 2020). This indicates that the workforce in the state-owned sector has a significantly higher level of skills compared to those in the non-state-owned sector, supporting the phenomenon that talent accumulates in the state-owned sector (Gindling et al., 2020). In terms of higher human capital, this talent accrual alleviates human capital deficit and improves allocation efficiency in the state-owned sector. In this case, if the total amount of human capital remains unchanged, human capital deficit in the non-state-owned sector increases, decreasing the overall efficiency of human capital allocation. Therefore, the wage premium in the state-owned sector can directly affect the level of human capital mismatch, with both positive and negative effects, and the results depend on which outcome has a greater impact. This leads us to Hypothesis 1.

> Hypothesis 1: Intersectoral income inequality has a direct impact on human capital mismatch.

Second, some workers in China's labour market hold jobs that do not correspond with their skill levels (Xu & Yu, 2020). To pursue the wage premium in the state-owned sector, parents will help their children to enter the state-owned sector through their social capital, thus making it easier for children with superior parental background to enter the 'primary sector' and high-income industries (Walder & Hu, 2009). In some cases, superior parental background is the key for children to gain 'entry' into state-owned enterprises (Ma et al., 2017). Thus, to an extent, parental advantages seem to replace children's skills. For jobs with specific skill requirements, the prerequisite of parents' superior class can be appropriately eased to reduce the job's skill level requirements. However, this increases the inconsistency between skill requirements and workers' actual skills and human capital mismatch. Based on this, we propose the following hypothesis.

Hypothesis 2: Intergenerational income inequality has a positive and direct impact on the level of human capital mismatch.

If Hypothesis 1 is confirmed, the possible outcome is that the wage premium leads to a disproportionate distribution of human capital to the state-owned sector and human capital deficit in the non-state-owned sector. An adequate level of human capital supply closely relates to skills mismatch (Brunello & Wruuck, 2021). Therefore, the state-owned sector's wage premium influences the efficiency of human capital allocation through skill mismatch. Intergenerational income inequality reduces workers' skill levels in certain jobs in the state-owned sector. This implies that workers with sufficient skill levels are excluded from the state-owned sector and find employment in the non-state owned enterprises. Therefore, intergenerational income inequality has a moderating effect on the impact of intersectoral income inequality. This improves the average skill level of workers in the non-state owned sector and alleviates the promotional effect of intersectoral income inequality on human capital mismatch to a certain extent. Therefore, Hypothesis 3 is proposed.

Hypothesis 3: Intersectoral and intergenerational income inequality have a negative interactional impact on human capital mismatch.

4. Research design

4.1. Empirical model

To test our hypotheses, we construct the following linear models:

$$Diss = \alpha 0 + \alpha 1 Rsoe + \alpha 2 Ela + \alpha 3 Rsoe \times Ela + \beta M + \mu \qquad (3)$$

where *Diss* is the degree of human capital mismatch; *Rsoe* is the wage premium in the state-owned sector, and thus the degree of intersectoral income inequality; *Ela* is the degree of intergenerational income inequality; *M* is a series of control variables, and *u* is a random item. If Hypothesis 1 holds, the coefficient α_1 should be significantly unequal to 0, that is, intersectoral income inequality has an impact on the level of human capital mismatch. If Hypothesis 2 holds, the coefficient α_2 should be greater than 0, that is, the higher the degree of intergenerational income inequality, the greater will be the level of human capital mismatch. If Hypothesis 3 holds, the coefficient α_3 should be significantly less than 0, that is, the interactional impact of intersectoral income inequality and intergenerational income inequality on human capital mismatch is negative.

4.2. Variable selection

4.2.1. Explained variable

The explained variable is the degree of human capital mismatch. The measurements and calculations are carried out based on Xu and Yu (2020):

$$Diss = \left(\frac{Xm - Xl}{Xh - Xl}\right)^2 \qquad (4)$$

where X_h, X_m and X_l indicate the points in time for the deflection points of high, medium, and low human capital wages in a region (represented by length of service). The estimates of X_h, X_m and X_l are obtained through the ordinary least squares (OLS) regression of the Mincer wage equation.

4.2.2. Explanatory variables

The main explanatory variables are the wage premium in the state-owned sectors (*Rsoe*) and intergenerational income inequality (*Ela*).

In terms of the first variable, wage premium in state-owned sectors (*Rsoe*), existing research always uses income measurement indicator systems based on monetary income. Thus, social classes, social resources, social insurances, invisible income, and other factors are not fully measured. In this study, we use social classes to replace monetary income, thus measuring the individuals' income and considering their non-monetary income as well. The measurement for wage premium in state-owned sectors is: $Rsoe = Classs1/Classs0-1$. $CLASS_{s1}$ indicates the average social class of individuals employed in state-owned sectors and $CLASS_{s0}$ denotes the average social class of individuals in non-state-owned sectors.

The second variable, intergenerational income inequality (Ela), is measured based on the matrix of transition probability. Rodgers (1995) and Saczewska-Piotrowska (2016) note that the matrix of transition probability can be used to measure changes in economic positioning from parents to offspring. Specifically, it can establish different income levels. If parents and offspring share the same income level, there is no intergenerational income conversion of households; however, if there are differences in their income levels, it indicates occurrence of intergenerational income conversion. In each region that we examine, we consider the probability of intergenerational income conversion in that region. We use social class in lieu of social income level to measure the conversion probability of income levels:

$$Tran = \frac{1}{m}\sum\nolimits_{i=1}^{m} TSi \tag{5}$$

where *Tran* represents the intergenerational conversion probability of the regional income level, where:

$$0<Tran<1 \tag{6}$$

and i in equation (5) indicates the i^{th} sample in the region; m the total sample number in that region; and *TS* a dummy variable, indicating the probability of intergenerational social class conversion of the sampled individuals. If parents and offspring share the same social class, the value is 0, and 1 otherwise. Thus,

$$Ela = -(Tranh1-Tranh0) \tag{7}$$

where *Tran* represents regional intergenerational transition probability; and *h0* represents workers without higher education and *h1* represents workers with higher education. Compared to workers without higher education, highly educated workers have an ability advantage. A higher value of (*Tranh1-Tranh0*) indicates that highly

Table 1. Definition of control variables.

Variable name	Variable abbreviation	Variable interpretation
Percentage of individuals involved in the region's secondary industry	*Pind2*	Refers to the percentage of the output value of the region's secondary industry in terms of regional GDP.
Percentage of individuals involved in the region's third industry	*Pind3*	Refers to the percentage of output value of the region's third industry in terms of regional GDP.
Regional social equity	*Uf*	Refers to the average value of regional samples' evaluation of social equity
Regional education structure	*Varedu*	Refers to the variance in education years among the regional samples
Number of colleges and universities in the region (average number during the past 20 years)	*Colle*	Refers to the average number of colleges and universities in the province where an individual has resided over the past 20 years.
Regional sex ratio	*Gen_av*	Refers to the percentage of male samples in the total sample.

Source: made by author.

educated workers' ability advantage results in higher levels of social strata mobility. Therefore, a high value of (*Tranh1-Tranh0*) denotes that the social stratum depends more on the individual's ability and less on parental class, indicating a lower degree of intergenerational income inequality.

4.3. Control variables

Table 1 shows the control variables included in the empirical model (equation 3).

4.4. Data

This study uses micro and regional data in the empirical research. The micro data are taken from the China Comprehensive Social Survey's (CGSS) sample data in 2010, 2012, 2013, and 2015. After excluding missing and abnormal values, we obtained 10,609 samples. The explained variable and explanatory variables are constructed using micro data. In addition, we collected 67 regional samples for our analysis. Regional level data were collected from the China Provincial Statistical Yearbook and the China Urban Statistical Yearbook over the years. Most of the control variables were obtained from regional data.

5. Empirical analysis

Using the stepwise regression method, the explanatory variables, 'wage premium in state-owned sectors (*Rsoe*)' and 'intergenerational income inequality (*Ela*)', and the control variables are introduced successively to verify if our hypotheses are tenable. Table 2 presents the regression results. The stepwise introduction of both the explanatory and control variables are shown in columns 1 to 4.

We used the instrumental variable method to check whether the explanatory variables are endogenous. In selecting the instrumental variables, we used the Bartlett method to construct the main instrumental variables for the explanatory variables *Rsoe*, *Ela*, and $Rsoe \times Ela$. This specific method aims to sort the explanatory variable X according to the observed value and divide it into three groups on average. The

Table 2. Intersectoral and intergenerational income inequality, and human capital mismatch results.

	Column 1	Column 2	Column 3	Column 4	Column 5
Estimation method	OLS	OLS	OLS	OLS	TSLS
Rsoe	−1.071***	−0.883**	−0.429***	−0.177***	−0.079***
	(−2.853)	(−2.336)	(−3.236)	(−3.112)	(−3.053)
Ela	——	10.189**	10.164**	11.092***	11.730***
		(2.053)	(2.429)	(2.777)	(3.571)
Rsoe × *Ela*	——	——	−24.668***	−24.283***	−29.709***
			(−5.200)	(−4.797)	(−4.653)
Pind2	——	——	——	0.210***	0.212***
				(3.617)	(3.468)
Pind3	——	——	——	0.183***	0.191***
				(3.267)	(3.291)
Uf	——	——	——	−2.163**	−2.463**
				(−2.077)	(−2.121)
Varedu	——	——	——	−0.111*	−0.121*
				(−1.672)	(−1.669)
Colle	——	——	——	−0.029**	−0.028**
				(−2.480)	(−2.213)
Gen_av	——	——	——	−1.559*	−1.698
				(−1.725)	(−0.912)
Constant term	1.637***	1.574***	1.309*	−7.178*	−6.058*
	(7.138)	(6.963)	(6.638)	(−1.921)	(−1.683)
Sample size	67	67	67	67	67
F statistics	8.141	6.379	14.995	7.443	7.573
R^2	0.111	0.166	0.417	0.540	0.411
Kleibergen-Paap rk LM *P*-value	——	——	——	——	0.006
Cragg-Donald F statistic	——	——	——	——	11.627
Prob(Hansen J statistic)	——	——	——	——	0.185
Hausman *p*-value	——	——	——	——	0.614

Note: Values in parentheses are t values, '* * *', '* *', and '*' indicate significance at the level of 1%, 5%, and 10%, respectively.
Source: made by author.

Bartlett instrumental variable is recorded as ZX: the ZX value of the group with the larger value of X is 1, the ZX value of the group with the smaller value of X is -1, and the ZX value of the group with the median value of X is 0. Based on the main instrumental variables, the regional proportion of parents in a vulnerable class, and the regional proportion of individuals with higher education are included as the instrumental variables. We used the Kleibergen-Paap rk LM statistics, Cragg-Donald F statistics, and Hansen J statistics to examine the problems of insufficient identification of instrumental variables, weak instrumental variables, and endogenous instrumental variables. The results in Table 2 show that the p-value of the Kleibergen-Paap rk LM statistic is 0.006; the problem of insufficient identification of instrumental variables can be rejected at 1% significance. The Cragg-Donald F statistic is 11.627, and the critical value at 5% significance is 9.53; thus, the original hypothesis of weak instrumental variables is rejected. The Hansen J statistic's p-value is 0.185; thus, the original hypothesis of exogenous instrumental variables cannot be rejected at 10% significance. Therefore, the selection of instrumental variables is considered reasonable. The Hausman p-value is used to test the exogeneity of the explanatory variables. As shown in Table 2, the Hausman p-value is 0.614, and the original hypothesis regarding the exogeneity of the explanatory variables cannot be rejected at 10% significance. Therefore, equation (3) can be directly regressed using the OLS method. To observe the model's robustness, equation (3) is regressed using the two-stage least-squares

(2SLS) regression method, and the results are reported in column 5 of Table 2. Compared with the OLS regression results, the 2SLS results do not show any significant changes regarding the significance of the variables, coefficient estimates, and coefficient symbols. Therefore, the model is robust.

5.1. Analysis of empirical results

In columns 1 and 2 of Table 2, the impact of the wage premium in the state-owned sector (*Rsoe*) on the degree of human capital mismatch (*Diss*) is significantly negative. This denotes that the overall income inequality between sectors alleviates the degree of regional human capital mismatch, which contrasts with the results in existing research (Li & Nan, 2019). After introducing the interaction term ($Rsoe \times Ela$), as shown in columns 3 and 4, the coefficient of *Rsoe* remains considerably negative, and the significance improves. From an econometric perspective, this indicates that intersectoral income inequality has a direct and negative impact on human capital mismatch. These results show that Hypothesis 1 is supported.

The explanatory variable intergenerational income inequality (*Ela*) is introduced in column 2. Moreover, columns 2 to 4 show a considerable and positive impact on *Diss*, and there is no significant change in the estimated value of the coefficient, positive-negative sign, or significance level. This denotes that intergenerational income inequality has a significant and positive effect on the level of human capital mismatch. Therefore, Hypothesis 2 is supported.

The interaction term ($Rsoe \times Ela$) is introduced in column 3. The impact of $Rsoe \times Ela$ on *Diss* is significant and negative in columns 3 and 4, and no meaningful change is observed in the estimated value of the coefficient, positive-negative sign, or significance level. This shows that the interaction term between intersectoral and intergenerational income inequality has a significant and negative impact on the degree of human capital mismatch. Therefore, Hypothesis 3 is supported.

Thus, the results presented in columns 1 to 4 in Table 2 confirm the impact of income inequality on human capital allocation in the state-owned sector and reveal its impact path. Income inequality in the state-owned sector includes both intersectoral and intergenerational income inequality. Intersectoral income inequality has a negative and direct impact, whereas intergenerational income inequality has a positive and direct impact on the degree of regional human capital mismatch. Hence, the interactive impact of these inequalities on the degree of regional human capital mismatch is negative.

5.2. Further analysis

Further analysis of the results shown in Table 2 reveals that both intersectoral and intergenerational income inequality have a direct impact and reciprocal effect on the level of regional human capital mismatch. Considering Eq. (3), we can see that $\alpha 1 = -0.177$, $\alpha 2 = 11.092$, and $\alpha 3 = -24.283$. We can, therefore, calculate the net impact of intersectoral income inequality on the regional human capital mismatch level, expressed as follows:

$$\partial Diss/\partial Rsoe = \alpha 1 + \alpha 3 Ela \tag{8}$$

We can recognise that $\partial Diss/\partial Rsoe > 0$ as $Ela > 0$ in all the samples. This denotes that the net impact of intersectoral income inequality on the regional human capital mismatch level is negative. The intersectoral income inequality alleviates the regional human capital mismatch level.

The net impact of intergenerational income inequality on the level of regional human capital mismatch can be expressed as follows:

$$\partial Diss/\partial Ela = \alpha 2 + \alpha 3 Rsoe \tag{9}$$

Thus, we observe that when $Rsoe < -{}^{\alpha 2}/_{\alpha 3} = 0.457$, we have $\partial Diss/\partial Ela > 0$, indicating that the net impact of intergenerational income inequality on the regional human capital mismatch level is positive. Of the 67 regional samples that were selected, 22 showed intersectoral income inequality greater than 0.457. The intergenerational income inequality promotes the regional human capital mismatch level. When $Rsoe > -{}^{\alpha 2}/_{\alpha 3}$, we have $\partial Diss/\partial Ela < 0$, indicating that intergenerational income inequality alleviates regional human capital mismatch. Of the 67 regional samples selected, 22 showed intersectoral income inequality lower than 0.457.

Therefore, based on further analysis, we confirm that there are differences in the impact of intersectoral and intergenerational income inequality on human capital mismatch in China. The impact of intersectoral income inequality on human capital mismatch is always negative, whereas the impact of intergenerational income inequality on human capital mismatch depends on the regional intersectoral income inequality level.

6. Conclusion, limitation and policy recommendations

In contrast to other studies that examined the relationship between intersectoral income inequality and human capital allocation, we separated income inequality into intersectoral and intergenerational income inequality. As a result, we measured human capital allocation based on the human capital mismatch level. We studied the relationship between income inequality and regional human capital allocation from the perspective of state-owned sectors and our conclusion differs from some existing studies.

By proposing relevant theoretical assumptions and empirical tests, we conclude that income inequality influences regional human capital allocation as follows. First, intersectoral income inequality has a direct and negative impact on the regional human capital mismatch level, whereas intergenerational income inequality has a direct and positive effect. Finally, the interaction of intersectoral and intergenerational income inequality has a negative impact on human capital mismatch. Further analysis shows differences in the net impact of intersectoral and intergenerational income inequality on human capital mismatch in China. The net impact of intersectoral income inequality on human capital mismatch is invariably negative, while the negative impact of intergenerational income inequality on human capital mismatch depends on the level of regional intersectoral income inequality.

Our study limitation is from a research perspective. This study assumes that China's income inequality affects human capital allocation at the regional level by influencing workers' employment behaviour in state-owned sectors, but it does not account for the impact of income inequality in non-state owned sectors. Future research can address this limitation.

Based on the main conclusions, we suggest relevant policy implications from the perspective of China's two development goals of 'more full and high-quality employment' and 'significantly improved distribution structure'. First, while formulating and realising these development goals, regional differences must be considered during policy articulation. Due to the objective imbalance of regional development in China socially and economically, there is an inconsistent relationship between improving income equality across regions and optimal human capital allocation. Adopting a 'one size fits all' policy for different regions may result in conflicting outcomes. Second, realisation of these development goals must be long term and phased. During the process of formulating relevant policies, authorities must focus on regional differences and note the time limitations of the appropriate policies. This is because the impact of human capital allocation following any improvement in equity is constantly changing. In the early stage of governance, that is, during the period of intergenerational income inequality, the relationship between improving income equity and optimisation of human capital allocation conflicts to a certain extent. However, this variance dissipates when the degree of income equality increases. Therefore, intergenerational income inequality will become the main conflicting factor in optimising human capital allocation. Thus, the formulation of relevant policies must be long term and phased.

Disclosure statement

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