INTERPRETING OVERALL INEQUALITY IN CHINA: THE ROLES OF PHYSICAL CAPITAL, HUMAN CAPITAL AND SOCIAL CAPITAL

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Abstract:
This paper investigates the relationship between overall inequality in China and the contributions of physical capital, human capital and social capital. The investment in physical capital tends to enlarge overall inequality while human capital helps to reduce the inequality. Human capital appears to be more influential than physical capital in overall inequality reduction in the research period. Social capital (people's social networks) however, does not seem to exert any impact on overall inequality in the post-reform era. Possible policy implications of these results are that measures should be taken to pursue more even distributed investment of physical capital and to increase people's education in order to reduce overall inequality in China.

Keywords: Overall inequality, Capital investment, Economic growth, China
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1. Introduction

Unlike the US, Japanese prefectures and European regions where convergence across regions occurs (Barro and Sala-i-Martin, 2003), China, however, provides a different case of which regional inequality has risen and varied in the past two decades (Khan and Riskin, 2001; Fan and Sun, 2008). The Gini coefficient in China is estimated to be 0.33 in 1980 and rose to 0.45 to 0.47 in recent years (Sisci, 2005; World Bank, 2006). Many studies have attributed Chinese regional inequality to many factors like factor endowments (Chen and Fleisher, 1996), urban-biased fiscal and monetary policies (Yang and Cai, 2000), regional policy which boosted capital investment in eastern provinces and open economic zones (Wei and Fan, 2000). Basically, the variation of regional inequality in China is deep rooted in the over three-decade fast Chinese economic growth ever since 1978 (Pei, 2006; Lee, 2007). It is the uneven distribution of economic growth among different regions/provinces that lead to the regional inequality. Thus, the driving factors to the economic growth would fundamentally influence the variation of regional inequality in China.

Generally, physical capital has been found to play a key role for the Chinese economy in the post-reform era (Chow, 1993; Urel and Zebregs, 2009). Human capital in terms of years of education has also been found to play an important role in the economic growth. It is believed that human capital contributes to technological improvement and innovation which can help to advance the economy (Wang and Yao, 2003; Kuo and Yang, 2008). The connection between social capital and economic development has been highlighted in a large number of studies over the last 15 years (Westlund and Adam, 2010). Particularly, with the declining of the relative importance of natural endowments for regional development and the convergence trend in human capital, social capital becomes increasingly important for economic growth (Mohan and Mohan, 2002). Thus, the different roles of the three capitals in economic growth across provinces would lead to regional inequality in China. The paper aims to interpret such

topic and provide implications for policy making to reduce regional inequality in China in the future.

2. Data and econometric framework

The paper focuses on the relationship between regional inequality and physical capital, human capital and social capital. In the benchmark model, we run fixed effect regression of panel data with Gini coefficient as the dependent variable and the three "capitals" as the main independent variable:

$$Inequality_{it} = \alpha_0 + \alpha_1 Physical_{it} + \alpha_2 Human_{it} + \alpha_3 Social_{it} + \alpha_4 X_{it} + \lambda_t + \xi_{it}$$

Where $Inequality_{it}$ is the measure of Gini coefficient of province i at year t. $Physical_{it}$ is the investment ratio which represents physical capital, $Human_{it}$ is the measure of human capital of province i at year t, proxied by student enrollment rate, $Social_{it}$ is measure of social capital of province i at year t. X is a vector of control variables that influence economic growth: economic openness (Trade), measured by the ratio of export and import to GDP; FDI (foreign direct investment), measured by the ratio of utilized FDI to GDP; governmental expenditure (Gov), measured as the ratio of government budget expenditure to GDP; state ownership (Soe), measured by the share of state owned enterprises in total industry output value. These variables generate impact on the capitals' efficiency and further influence the economic growth across provinces in China. λ_{it} is the year effect and ξ_{it} is an unobserved error term that varies across time and provinces. We collect data for 29 provinces in China from 1981 to 2010[1]. Almost all the data are from National Bureau of Statistics (NBS). Table 1 reports the descriptive statistics for the main variables.

Table1. Statistics of variables in the study

Variable	Obs	Mean	Std.Dev	Min	Max
Inequality	870	2.431	0.809	0.261	4.759
Physical	870	0.435	0.124	0.153	0.982
Human	870	0.007	0.008	0.0004	0.064
Social	609	1.37	0.625	0.42	4.210
Gov	866	0.144	0.063	0.048	0.548
Soe	870	0.606	0.198	0.107	0.938
Trade	860	0.239	0.347	0.006	2.203
FDI	870	0.024	0.033	0.000005	0.243

There are no statistics of Gini coefficients at provincial level in China. Then, we need to find a suitable proxy for Gini coefficient. Yang (1999) argues that increases in urban-rural income differentials have been the main driving force behind the rising overall inequality in China. According to World Bank (1997), the urban-rural income gap is responsible for a third of total China's inequality in 1995 and a half of the increase in inequality since 1985. Thus, we use urban-rural income differential to proxy Gini coefficient in each province. Following Putnam (2000), social capital has two main aspects: structural social capital (networks and associations) and cognitive social capital (attitudes and norms of behavior, shared values, reciprocity and trust). Thus, the measure of social capital consists of testing the public participation, social connections, general trust and social norms (Knack and Keefer, 1997). In this study, the measure of social capital covers the period 1990-2010. We only measure social capital at the principal level in China in terms of the number of associations for every 10,000 people to represent the structural capital of social networks and public participation. The association is a reciprocal organization constituted by people of common characteristics and non-profit and non-governmental are its fundamental features. Since there is no available data on provincial trust in the research period, we have no measure of cognitive social capital and therefore only examine the role of structural social capital in China.

3. Results and interpretation

3.1 The Benchmark Model

[1] We do not include Chongqing and Tibet due to data availability. Taiwan, Hong Kong and Macau are not included either.

As results in Table 2 shows, the estimated coefficient of *Physical* is positive and significant at 1 percent level. Keeping other things unchanged, a one percentage point increase in *Physical* will result in a 0.732 percentage point increase in Gini coefficient. *Human* contributes to the decrease of Gini coefficient. Keeping other things unchanged, a one percentage point increase in *Human* will result in a 1.291 percentage point decrease in Gini coefficient. *Social* is, however, found insignificant in the full sample regression. Further regression shows that both *Physical* and *Human* are significant in the three sub-periods. Besides, the coefficients of *Human* have been larger than that of *Physical*, indicating the more influential role of human capital in the reduction of Gini coefficient in China. Social capital still presents no significance in the three periods.

Table 2. Full sample and sub-period regression

Dependent Variable	*Full Sample Regression*			*1980s*	*1990s*	*2000s*
Inequality	1	2	3	4	5	6
Physical	0.333**	0.245**	0.732***	0.548**	1.081***	0.076***
	(0.144)	(0.145)	(0.158)	(0.267)	(0.276)	(0.012)
Human		-11.507***	-1.291**	-9.62***	-5.437**	-1.358***
		(3.427)	(0.514)	(3.453)	(2.151)	(0.433)
Social			-0.038		0.094	-0.045
			(0.035)		(0.061)	(0.036)
Gov	1.011***	0.775**	0.329	2.229***	3.301***	-0.149
	(0.353)	(0.358)	(0.425)	(0.598)	(1.033)	(0.135)
Soe	1.052***	1.083***	0.219	0.011	1.319***	0.106
	(0.0143)	(0.143)	(0.144)	(0.256)	(0.271)	(0.157)
Trade	0.057	0.138**	0.052	-0.129*	0.054	-0.061
	(0.052)	(0.057)	(0.066)	(0.113)	(0.091)	(0.096)
FDI	-0.352	-0.246	1.743	1.721	2.003***	0.373
	(0.516)	(0.514)	(3.532)	(2.199)	(0.72)	(0.856)
Estimation Method	FE	FE	FE	FE	FE	FE
Year-Specific Effect	YES	YES	YES	YES	YES	YES
Pro. Num.	29	29	29	29	29	29
Observations	856	856	609	276	290	290
R^2	0.403	0.427	0.214	0.306	0.048	0.002

Note: Standard errors are reported in parentheses. The symbols *, **, and *** indicate statistical significance at 10 percent, 5 percent and 1 percent levels, respectively.

3.2 Robustness check

3.2.1 Medium-term determinants

The paper constructs a panel that contains non-overlapping five-year averages of the data for each province. By taking such measure, we are able to reduce short-term variations and identify the medium-term determinants of Gini coefficient. As Table 3 shows, the estimated coefficient of *Physical* is positive and significant at 5 percent level while *Human* presents negative significance at 10 percent level in the full sample regression. Then, both *Physical* and *Human* start to be significant since 1990s. The estimated coefficient of *Human* has been larger than that of *Physical* in the sub-periods. *Social*, however, presents no significance in the whole and sub- study periods. These findings are in high accordance with results in Table 2.

Table 3. Robustness check: Five year average

Dependent Variable	*Full Sample Regression*			*1980s*	*1990s*	*2000s*
Inequality	1	2	3	4	5	6
Physical	0.708*	1.241***	0.701**	-1.781	2.519**	0.085**
	(0.401)	(0.347)	(0.416)	(1.42)	(0.885)	(0.048)
Human		-1.18*	-1.282*	-3.775	-17.48**	-0.69*
		(0.845)	(0.854)	(84.48)	(6.737)	(0.37)
Social			-0.105		0.129	0.059
			(0.072)		(0.194)	(0.088)
Gov	1.338*	1.079	1.088	1.957	-5.522*	-1.532
	(0.802)	(0.821)	(0.823)	(1.526)	(4.695)	(1.448)
Soe	1.189***	0.605	1.272***	-0.587	-0.852	0.074
	(0.346)	(0.406)	(0.348)	(0.789)	(0.786)	(0.359)
Trade	0.15	0.251	0.281	-0.231	0.491	-0.463
	(0.142)	(0.159)	(0.182)	(0.45)	(0.679)	(0.386)
FDI	-1.62	-1.506	-1.298	-1.408	1.427	2.777
	(1.345)	(1.343)	(1.403)	(11.5)	(3.247)	(3.609)
Estimation Method	FE	FE	FE	FE	FE	FE
Year-Specific Effect	YES	YES	YES	YES	YES	YES
Pro. Num.	29	29	29	29	29	29
Observations	174	174	172	56	58	58
R^2	0.404	0.429	0.426	0.066	0.1	0.082

Note: Standard errors are reported in parentheses. The symbols *, **, and *** indicate statistical significance at 10 percent, 5 percent and 1 percent levels, respectively.

3.2.2 Endogeneity problem

To deal with the potential endogeneity problem, we employ a generalized-methods-of-moments (GMM) panel estimator for dynamic model. We estimate the model by using the lagged values in levels of all explanatory variables. Generally, both *Physical* and *Human* are significant at 1 percent level in the whole and sub- research periods. As Table 4 shows, physical capital contributes to the increase of Gini coefficient while human capital leads to the decrease of Gini coefficient. The estimated coefficient of *Human* is larger than that of *Physical* in the whole research period. *Social* however, only presents negative significance in the 1990s. The results of endogeneity check are also in line with the results in Table 2.

Table 4. Robustness check: Endogeneity

Dependent Variable	*Full Sample Regression*			*1980s*	*1990s*	*2000s*
Inequality	1	2	3	4	5	6
$Inequality_{-1}$	0.476***	0.436***	0.788***	-0.071***	0.721***	0.389***
	(0.017)	(0.016)	(0.024)	(0.021)	(0.058)	(0.083)
Physical	0.833***	0.666***	0.446***	0.864***	0.586**	1.858***
	(0.125)	(0.119)	(0.099)	(0.307)	(0.295)	(0.318)
Human		-2.522***	-10.448***	-13.9***	-7.855***	-8.089***
		(0.192)	(1.676)	(4.622)	(2.271)	(2.637)
Social			-0.053***		-0.25***	-0.011
			(0.018)		(0.051)	(0.039)
Gov	1.022***	-0.303	1.025***	-0.527	2.46**	-0.417
	(0.261)	(0.268)	(0.229)	(0.633)	(1.039)	(0.475)
Soe	-0.086	0.507***	0.672***	-2.249***	0.894***	-0.258
	(0.098)	(0.103)	(0.085)	(0.33)	(0.188)	(0.199)
Trade	0.296***	0.027	0.02	0.147	-0.086	0.094
	(0.055)	(0.056)	(0.047)	(0.21)	(0.091)	(0.081)
FDI	1.891***	3.221***	1.099***	-0.413	2.326***	0.376
	(0.401)	(0.395)	(0.332)	(2.5)	(0.786)	(0.903)

Estimation Method	GMM	GMM	GMM	GMM	GMM	GMM
Year-Specific Effect	YES	YES	YES	YES	YES	YES
Pro. Num.	29	29	29	29	29	29
Observations	798	798	551	218	232	224

Note: Standard errors are reported in parentheses. The symbols *, **, and *** indicate statistical significance at 10 percent, 5 percent and 1 percent levels, respectively.

4. Concluding remarks

The paper provides robust evidence of the roles of physical capital, human capital and social capital in the changing overall inequality in the post-reform China. The investment of physical capital which plays an important role in advancing Chinese economy for decades actually contributes to the increase of overall inequality. Human capital which helps to reduce overall inequality, has also appeared to be more influential than physical capital in the research period.

There are no findings showing either positive or negative significance of social capital to overall inequality in China. Although Li and Westlund (2013) finds positive contribution of social capital (people's social networks) to Chinese economic growth in the 2000s, we think such economic role would finally transform into peoples's collaboration in collecting investment and other supports in economic activities. Since people's social connections in terms of their economic activities normally confine within certain area or region, thus its economic contribution across regions would present no big difference.

The implications for policy making lie in more even distributed physical capital investment, especially in the less developed provinces, and the continuous investment in people's education which may generate lasting effect on economic growth. These measures can help to reduce the overall inequality in China in the long run.

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