High-speed Rail and Inter-provincial Inequality in payoffs to human capital

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1 Literature Review

The literature review involves three themes which are related most closely with the topic of this paper: (i) regional inequality and its relationship with transportation infrastructure in China; (ii) the application of China Household Income Project (CHIP) data set in the topic of human capital; (iii) the adoption of counterfactual strategy.

1.1 Regional inequality and transportation

There exists a large amount of literature discussing regional inequality in China and potential causes of this phenomenon. According to existing literature, China witnessed a decline in regional inequality from approximately 1980 to 1990 (Chen and Fleisher, 1996), but then the regional inequality continues to increase (Zax, 2019; Tian et al., 2016; Yao and Zhang, 2001).

Using residuals from a fixed effect Solow growth model, Fleisher et al. (1997) find that total factor productivities in coastal provinces are twice as high as that in non-coastal provinces. Fleisher et al. (2010) measure inequality across major regions simply by the coefficient of variation of per-capita real gross domestic product and confirm that inequality in China increases from 1990s. Tian et al. (2016), Yao and Zhang (2001), and Pedroni and Yao (2006) all adopt the nonstationary panel techniques introduced by Evans (1998), using pair-wise convergence between provinces to measure regional inequality and divide provinces into different clubs. Tian et al. (2016) further

concludes that the inequality between the two clubs are increasing due to different investment in physical and human capital. Different from all the methods stated above, Zax (2019) uses a counterfactual strategy to calculate people's hypothetical earnings in different provinces and focuses on inequality in human capital payoff by comparing predicted earnings from different regions for a same individual. This paper follows the method developed by Zax and also puts emphasis on inequality in reward to education rather than general economic growth or productivity.

Zax (2019) just demonstrates the regional gaps in payoffs to human capital but does not explain relevant reasons. This paper tries to establish the relationship between regional inequality in returns to human capital and transportation infrastructure, focusing on high-speed rail (HSR). Fleisher et al. (1997) discover that the effect of infrastructure on total factor productivity is higher in coastal regions than interior regions in China. Using a panel data covering from 2000 to 2014, Chen and Haynes (2017) find that the development of HSR helps decrease regional disparities. They adopt the rail network density and accessibility to capture quantity and quality change in rail investment. Banerjee et al. (2012) address the endogeneity issue between transportation investment and economic development through utilizing the fact that transportation networks tend to connect historically important cities. They conclude that access to transportation networks is beneficial to regional economic growth.

1.2 The application of China Household Income Project

CHIP data set provides comprehensive details on individual earnings, so it is broadly adopted in literature studying human capital and earnigns in China. Liu (1998) exploits the 1988 CHIP survey to estimate cross-industrial return to human capital. He finds that return to education varies from 3% to 6% and is higher in industrial sectors. The article also identifies two labor reform programs and obtains significant and positive effects of them on earnings. Li (2003), using CHIP survey in 1995, argues that return to education was underestimated in previous literature and educated people are more rewarded in less-developed, low-income provinces.

Both Whalley and Xing (2014) and Zax (2019) incorporate multiple waves of CHIP surveys in their research. Whalley and Xing (2014) estimate return to education in

1995, 2002, and 2007 and find that only coastal regions witnessed an increase in skill premia during 2002-2007 and urban-rural wage inequalities are also more obvious in such regions. Besides, this kind of variation in earnings are increasing in China. Zax (2019) uses CHIP data from 1988 to 2013 and suggests that cross-provincial inequality in human capital decreases over time.

1.3 The adoption of counterfactual strategy

Counterfactual strategy is often applied in regional inequality studies to explore how the differences in some regional structures, such as population, industrial sectors, labor allocation etc., affect cross-regional inequalities.

Zhang et al. (2015) calculate counterfactual per capita output inequality level cross provinces by assuming that all provinces have the same age structure as the national average level. The result suggests that Gini coefficient would decline by 13% under the counterfactual assumption. Démurger et al. (2009) simulate counterfactual job status, earnings, and working hours to decompose urban-rural income inequality into four sources. The study finds that population effect is the most robust and significantly important one in influencing income differences between rural migrants and urban residents. Xing (2014) calculates the counterfactual earnings of rural-urban migrants, assuming that they are paid as rural local workers. The comparison between predicted earnings and actual rural wage densities help examine self-selection in rural-urban migration.

1.4 Contribution of the paper

This paper also adopts counterfactual strategy and uses CHIP data set from 1988 to 2013. The paper mainly contributes to existing literature on two aspects. The first is that the paper combines counterfactual strategy and computational technologies to more precisely measure regional inequality in payoffs to human capital. Most previous studies use ordinary least squares (OLS) to implement counterfactual strategies. The paper compares OLS, Lasso regression, Ridge Regression, and Random Forest to find the most accurate estimation of regional payoffs to education level according to their mean squared errors. K-fold cross validation is used to test the fitness of each model.

Besides, the paper also digs more deeply into the topic by building a relationship between regional inequality in human capital valuation and transportation. Most previous research focuses on the effect of infrastructure on macro indices such as regional economic growth. It is also meaningful to investigate whether transportation would influence personal choices of migration especially when human capital are rewarded higher outside home cities.

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