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Access to college and heterogeneous returns to education in China☆

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ABSTRACT

We apply a semi-parametric latent variable model to estimate selection and sorting effects on the evolution of private returns to schooling for college graduates during China's reform between 1988 and 2002. We find that there were substantial sorting gains under the traditional system, but such gains have dissipated to negligible levels in the most recent data. We take this as evidence of growing influence of private financial constraints on decisions to attend college as tuition costs have risen and the relative importance of government subsidies has declined. The main policy implication of our results is that labor and education reform without concomitant capital market reform and government support for the financially disadvantaged exacerbates increases in inequality inherent in elimination of the traditional "wage-grid".

1. Introduction and background

Two salient features of the labor force in centrally planned economies were the wage-grid and the *nomenklatura*. The wage-grid system compressed wage differentials across education groups, while the *nomenklatura* system selected who attended college to acquire knowledge and training to function in the planning bureaucracy. In 1978 China entered a period of transition to market systems. During transition, wage-grids were gradually relaxed or removed, and wage differentials have increasingly reflected

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market outcomes; educational attainment, especially at higher levels, has become subject to conscious choices made by each individual.[1]

The higher education system in China went through drastic changes as the economic reform forged ahead. The national college entrance exam was resumed in 1977, which reestablished academic standards for college admission.[2] New enrollment increased steadily from 273 thousand in 1977 to 3.2 million in 2002, and the number of higher education institutions increased from 404 to 1396 during the same period (*China Education Statistical Yearbooks*). Capacity expansion has outpaced the number of high school graduates, and therefore the college admission rate has risen substantially from a miniscule 4.8% in 1977 to 63% in 2002.[3]

Until the early 1990s, Chinese universities did not charge tuition and students were also provided with free dormitory accommodation. More recently, however, policy changes have required a growing proportion of college students to fund their own educational expenses (Hannum & Wang, 2006; Heckman, 2005). By 1997, tuition became mandatory in all colleges in China, and the average annual tuition reached about 31% of per capita GDP. This ratio rose to 46% in 2002, roughly the same level as for private colleges and universities in the U.S. (Li, 2010). Between 1992 and 2003, the government share in total education expenditures in China decreased from 84% to 62%, and the share of tuition and fees in total education expenditures increased from about 5% to approximately 18% (*China Statistical Yearbook* 2005). While a nationwide need-based financial aid program was initiated in 1999, it encountered several major problems in implementation and only became fully operational in 2007 (Yang, 2008).[4] Thus, higher education has gradually changed from supply-side funded to demand-side funded during our sample period of 1988–2002.[5]

Despite the rising private cost of attending college, there is evidence that returns to schooling in China have increased since the early 1990s (Li, 2003; Yang, 2005; Zhang, Zhao, Park, & Song, 2005). The rising return to schooling most likely has contributed to growing income inequality.[6] According to Yang (1999, 2002), China in the late 1990s surpassed almost all countries in the world for which data are available in income inequality. A major concern addressed in this paper is that growing inequality in *access* to education may have contributed to the rising income inequality. Evidence that this concern is well founded is vividly presented by Hannum and Wang (2006). Using 2000 Census data, they show that the fraction of variation in years of schooling explained by birth province increased steadily during our sample period.

Higher educational attainment depends recursively on earlier access to publicly and privately supported education at lower levels as well as on the capacity to borrow funds to pay direct and indirect college costs (Carneiro & Heckman, 2002; Hannum & Wang, 2006). If access to all levels of schooling is available only to the financially and geographically advantaged, the bulk of China's population will be excluded from full participation in the growth of human capital and the income it produces. In China, the proportion of the population privileged to attend college has been and remains small by almost any standard, despite a sharp acceleration of schooling expenditures and expansion of enrollment in the past decade (Fleisher & Wang, 2005; Heckman, 2005): 0.6% in 1982, 1.4% in 1990, 2.0% in 1995, 4.1% in 2001, and 6.2% in 2006, according to various issues of *China Statistical Yearbook*.

We exploit three cross-sectional data sets, collected in 1988, 1995, and 2002.[7] Our sample years represent three distinct stages of China's transition from tuition-free college with some living allowances, through the 1989 beginnings of the transition away from "free" college education to mandatory tuition in all colleges. This transition had advanced by 2002. Throughout this period and especially after 1998, higher education capacity expanded rapidly. Universities increased enrollment substantially, and the government initiated a number of policies to foster world-class universities in China.[8]

Following Griliches (1977), a great deal of effort has been devoted to correcting biases in estimating returns to schooling caused by unobserved ability and measurement error (Card, 1999, chap. 30). However, the instrumental variables (IV) method suggested to correct bias breaks down when returns are *heterogeneous*. In the strand of research pioneered by Roy (1951), Willis and Rosen (1979), and Willis (1986, chap. 10), it is assumed that schooling decisions are conscious choices by rational forward-looking individuals who act on their anticipated *heterogeneous* returns to education. Under these conditions, the appropriate procedure is to estimate a latent variable model with correlated random coefficients.

We use methods developed in Heckman and Vytlacil (1999, 2000) that combine the treatment effect literature

[1] There is a growing literature on returns to education and wage differentials experienced in transitional economies. See Brainerd (1998) on Russia; Munich, Svejnar, and Terrell (2005) on the Czech Republic; Orazem and Vodopivec (1995) on Slovenia; and Jones and Simon (2005) on Bulgaria. Fleisher, Sabirianova, and Wang (2005) provide a comparative study of eleven former centrally planned economies including Russia and China.

[2] National college entrance exam started in 1952 but was abandoned from 1966 to 1976 at the upheaval of the Cultural Revolution. There was no new enrollment from 1966 to 1971, and the new admissions from 1972 to 1976 were based on family backgrounds and political considerations.

[3] Admission rates are from the National Education Examination Authority web site at http://www.neea.edu.cn/.

[4] For example, from 1999 to 2004, 1.9 million college students applied for need-based government-assisted loans, less than half (i.e., 0.86 million) received the aid. By 2007, about 4 million college students received the aid, accounting for about 20% of total enrollment (Yang, 2008).

[5] The government has gone as far as advocating "commercialization of higher education", implying higher education institutions should be for-profit. See Yang (2008) for more details.

[6] Yang (2005) shows that the dispersion of returns to schooling across Chinese cities increased sharply between 1988 and 1995. Zhu (2011) also reports substantial heterogeneity in schooling coefficients between 1995 and 2002. Wang et al. (2007) provide most recent evidence of rising income inequality from 1987 to 2002 in China.

[7] These are not panel data sets.

[8] See Li (2010) for a review of higher education in China.