

# EDUCATIONAL QUALITY AND THE RETURNS TO A BACCALAUREATE DEGREE FOR MINORITIES IN CHINA

Samuel L. Myers Jr.\*

Gregory N. Price\*\*

Ding Sai\*\*\*

## Abstract

*This paper considers the extent to which the labor market returns to a baccalaureate degree, and its quality varies by ethnicity in China. Data from the 2002 Chinese Household Income Project are utilized to estimate the labor market return to graduating from college relative to high school. We allow for selection and heterogeneous returns by ethnicity, and estimate three treatment parameters that enable identification of the returns to a baccalaureate degree for minorities in China, and how it varies by the quality of the institution awarding the baccalaureate degree. Parameter estimates reveal that for minorities, the average treatment effect is low relative to the Han majority, nonexistent for those actually receiving the treatment, and would be positive for those who could have earned a baccalaureate degree but did not. Our results suggest that while post-reform era higher education and labor market policy in China may have been effective at narrowing the college completion and employment disparity between minorities and the Han majority, existing disparities can be eliminated by further expanding the pipeline of minorities that complete high school and enter into colleges/universities that grant baccalaureate degrees.*

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\*Humphrey School of Public Affairs, University of Minnesota, 301 19th Ave. South, Minneapolis MN, 55455, email: myers006@umn.edu

\*\* Department of Economics, Morehouse College, 830 Westview Dr., Atlanta GA, 30314. email: gprice@morehouse.edu, Tel #: (404), 653-7870.

\*\*\*Institute of Ethnology and Anthropology, Chinese Academy of Social Sciences, Bldg. 6/27, Zhongguancun, Nandajie, Beijing, 10081 Peoples Republic of China, email: dingsai@cass.org.cn

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## I. Introduction

In her consideration of how educational attainment in China is stratified by ethnicity, Hannum (2002) indicates that one reason why an ethnic-majority educational attainment disparity exists may be due to ethnic groups perceiving that the tangible returns to education may be low. Of course, to the extent that there is ethnic discrimination in China's labor market ( Johnson and Chow, 1997; Li, 2003; Zang, 2008) that lowers the return to investment in human capital, then relative to the Han majority, members of China's 55 officially recognized ethnic groups would have an incentive to invest less in human capital. Given China's post-reform deliberate affirmative action policy efforts at reducing ethnic economic inequality (Mishra and Smith, 2010; Zang, 2008), the existence of ethnic labor market discrimination that can induce ethnic inequality in educational attainment would suggest that such policy efforts have not succeeded.

Notwithstanding post-reform official affirmative action for ethnic minorities in China, there is evidence that minorities are still disadvantaged relative to the Han majority. For example, this relative disadvantage manifests itself in education (Hannum, 2002; Rong and Shi, 2001; Wu, 2010), the labor market ( Becquelin, 2000; Hannum and Yee, 1998; Maurer-Fazio, Hughes, and Zhang, 2010; Yee, 2003; Zang, 2008), the incidence of poverty (Gustafsson and Sai, 2009a), and in living standards (Gustafsson and Sai, 2009b). With respect to labor market earnings, Johnson and Chow (1997), Li (2003), and Xiaowei and Lulu (2001) find evidence of minority-Han majority differentials that is suggestive of discrimination against minorities in the post-reform era.

As post-reform China educational policy has implemented an aggressive affirmative action admissions policy for minorities (Zang, 2008), this paper considers the extent to which the labor market returns to a baccalaureate degree, and its quality varies by ethnicity in China.<sup>1</sup> Such a consideration will permit an assessment as to how effective post-reform efforts at eradicating ethnic inequality through enhancing access to higher education has been. To the extent that the transition to a

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<sup>1</sup>Zang (2008) describes these post-1977 affirmative action policies as reflecting the desire of the Communist Party to promote inter-ethnic peace and political stability. With respect to college admissions, relative to the Han majority, minority students are admitted into colleges/universities with lower admission test scores. In addition, minorities are given a preference over the Han majority in hiring if they have similar or slightly lower qualifications.

more market-oriented society increases the responsiveness of earnings to the quality of human capital (Zhong, 2011), our consideration of educational quality will permit insight into how the return to educational quality varies, if at all between minorities and the Han majority. Data from the 2002 Chinese Household Income Project are utilized to estimate the labor market returns to graduating from college relative to high school. We allow for selection and heterogeneous returns by ethnicity, and estimate three treatment parameters that enable identification of the returns to a baccalaureate degree for minorities in China, and how it varies by the quality of the institution awarding the degree.

The remainder of the paper is organized as follows. In Section II the data and empirical methodology are discussed. Our econometric strategy for identifying the relative minority to Han majority returns to 4 years of college views college graduation as a heterogeneous treatment. In particular we view being a minority in China as a source of heterogeneous outcomes in the labor market. We report parameter estimates in section III, and the last section concludes.

## II. Data and Empirical Methodology

Our data are from the 2002 Chinese Household Income Project (Shi, 2002). In particular, we use the Urban Individual Income, Consumption and Employment Data, as it enables estimation of earnings equations in the large Chinese urban labor market.<sup>2</sup> The 2002 Chinese Household Income Project was designed and implemented to measure and estimate the distribution of personal income and related economic factors in both rural and urban areas of the People's Republic of China. The measures of earnings are based on cash payments and on a broad range of additional components. The Urban Individual Income, Consumption and Employment Data provides standard demographic

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<sup>2</sup>The 2002 Chinese Household Income Project consists of 10 datasets: 1.) Urban Individual Income, Consumption, and Employment Data, 2.) Urban Household Income, Consumption, and Employment Data, 3.) Urban Individual Annual Income Data (Survey Appendix), 4.) Urban Household Assets, Expenditure, Income, and Conditions Data (Survey Appendix), 5.) Village Administrative Data, 6.) Rural Individual Income, Consumption, and Employment Data, 7.) Rural Household Income, Consumption, Employment, Social Network, Quality of Life, and Village Affairs Data, 8.) Rural School-Age Children Data, 9.) Rural-Urban Migrant Individual Data, and 10.) Rural-Urban Migrant Household Data. We use the data compiled by the Inter-university Consortium for Political and Social Research (ICPSR) available at <http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/21741>.

variables such as the individual's ethnicity, as well as economic variables such as medical insurance and expenditures, economically productive social contacts, and employment information including occupation, sector, income, hours, conditions, job history, and training. All data were collected through a series of questionnaire-based interviews conducted in rural and urban areas at the end of 2002.

As in Heckman and Li (2004), we consider a potential outcomes specification of a Mincerian earnings equation of the form  $\ln Y_i = \beta_i S_i + \gamma X_i + U_i$ , where  $Y_i$  is a measure of earnings,  $S_i = 1$  for individuals with a baccalaureate degree and  $S_i = 0$  if an individual is a high school graduate,  $\beta_i$  is the heterogeneous return to education,  $X_i$  is a vector of conditioning variables with effects given by the vector  $\gamma$ , and  $U_i$  is an error term. Given the two potential outcomes  $Y_i = S_i \ln Y_{1i} + (1 - S_i) \ln Y_{0i}$ ,  $U_i = S_i U_{1i} + (1 - S_i) U_{0i}$ , and individuals select going to college or not according to  $S_i^* = f(Z)$ ,  $S_i = 1$  if  $S_i^* \geq 0$ , where  $S_i^*$  is a latent variable capturing the net benefit of an individual earning a baccalaureate degree, and  $Z$  is a vector of variables that determine  $S_i^*$ .

Given the treatment  $S_i$ , three treatment effects can be defined and estimated: 1.) The Average Treatment Effect (ATE), 2.) The Average Treatment Effect on the Treated (ATET), and 3.) The Average Treatment Effect on the Non-Treated (ATENT). For  $S_i = 1$ , ATE measures the treatment effect for a randomly selected member of the population and ATET measures the treatment effect for those who actually received the treatment. ATENT measures the treatment effect on those who did not receive the treatment had they in fact received the treatment. If there is selection into treatment and treatment effects are heterogeneous such that individual characteristics in  $X_i$  condition outcomes, then in general  $ATE \neq ATE(X_i)$ ,  $ATET \neq ATET(X_i)$  and  $ATENT \neq ATENT(X_i)$ .

Our strategy to determine if the returns to a baccalaureate degree are different between minorities and the Han majority is to determine if ethnicity is a source of heterogeneity in the labor market returns to a baccalaureate degree. The same strategy is adopted for the returns to a baccalaureate degree given the quality of the college/university from which the degree was earned. We specify and estimate a Mincerian earnings equation where  $Y_i =$  annual earnings, and the elements of  $X_i$  include, years of labor market experience, a binary indicator for being male, a binary indicator for being a member of the communist party, a binary indicator for being employed in the manufacturing sector, and a binary indicator for being employed in a state-owned enterprise. We consider three treatments

( $S_i$ ): Graduated from college, Graduated from a college ranked very good, and Graduated from a college ranked good.

All covariates are derived from relevant questions from the Urban Individual Income, Consumption and Employment Data, in the 2002 Chinese Household Income Project, for which a summary is reported in Table 1. The control group is high school graduates. While political variables are not typically included in Mincerian earnings equations, we include a dichotomous indicator of Communist Party membership as there is evidence that it appears to matter for earnings in China (Li, Liu and Zhang, 2007).

### III. Results

Table 2 reports the relevant treatment effects. The results in the first column assume no selection into a homogeneous treatment and are based on an Ordinary Least Squares (OLS) specification of  $\ln Y_i$ . The second column assumes selection into a homogeneous treatment. The last three columns assume selection into a heterogeneous treatment, where the heterogeneity is conditioned on whether or not an individual is a member of ethnic group. Given that the ATE is no longer a singleton when there is heterogeneity and selection in treatment outcomes, we report the ATE, ATET and ATENT when conditioning on an individual's minority status. With the exception of the treatment parameter estimates with heterogeneity conditioned on minority status reported in the last three columns, the specifications are estimated with the person-level weights provided by Song, Sicular, and Ximing (2013).

As we could not find a suitable instrument such as family background variables (Hoogerheide, Block and Thurik, 2012), we used a Heckit two-step approach without exclusion restrictions.<sup>3</sup> As such, a crucial identifying assumption is that the selection hazard—or inverse Mills ratio—is exclusively nonlinear (Puhani, 2000). Given this assumption, and the fact that the Heckit selection terms were not significant in any of the selection specifications, we use a bootstrap (Efron and Tibshirani, 1993) with 100 replications in all the Heckit selection specifications to estimate the standard errors for

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<sup>3</sup>We used a Stata module called *IVTREATREG* to estimate the treatment effects with selection and heterogeneity, which is available at <http://ideas.repec.org/c/boc/bocode/s457405.html>

the treatment effects. The insignificance of the selection terms could result from selection into the treatment being misspecified, and Goncalves and White (2005) find that bootstrapped standard errors provide consistent estimators of the asymptotic variance of parameter estimates in linear regression models that are possibly misspecified.<sup>4</sup>

The simple ATE results in the first column suggest that for both minorities and the Han-majority, the labor market returns to a baccalaureate degree are substantial, and increase with the quality of the college/university granting the degree. The annual return for just having a baccalaureate degree is approximately 10 percent, and this increases to approximately 11 percent and 12 percent for graduating from a college/university ranked very good and good respectively.<sup>5</sup> These estimates are approximately similar to those reported by Heckman and Li (2004), and provide further evidence of the increasing returns to education in post-reform era Chinese labor markets.

Given selection into treatment, the ATE results in the second column reveal that the labor market returns to a baccalaureate degree are higher than estimated by simple OLS—which suggests that simple OLS estimates of the ATE are downwardly biased.<sup>6</sup> The annual return for just having a baccalaureate degree is approximately 15 percent, and this increases to approximately 20 percent and 13 percent for graduating from a college/university ranked very good and good respectively. The pattern of the selection-adjusted ATE estimate is similar to the OLS estimate, as the labor market return to a baccalaureate degree is increasing in the quality of the college/university from which the degree was earned.

The last three columns report selection-adjusted treatment effects allowing the heterogeneity in the labor market return for a baccalaureate degree to be conditioned on minority status. The ATE

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<sup>4</sup>For the heterogeneous treatment specifications, we could not estimate the parameters with the household weights as STATA does not enable the use of sampling weights with bootstrapped standard errors. However, to the extent that bootstrapped standard errors enable consistent estimation of parameters given misspecification (Goncalves and White, 2005)—in this the omission of sampling weights—the estimates of the treatment effects without the sampling weights is not necessarily a source of bias.

<sup>5</sup>As the return is relative to high school, the annual return is the estimated treatment effect—which is the change in annual earnings—divided by the assumed 4 years spent earning a baccalaureate degree.

<sup>6</sup>Card (1999) posits that OLS estimates of the labor market returns to schooling are downwardly biased as a result of individuals with high discount rates choosing low levels of schooling, which have a higher marginal rate of return.

estimates reveal that for minorities, the labor market returns to a baccalaureate degree is lower, as for all three treatments, relative to the ATE estimates for the entire labor market, minority status is associated with a lower ATE. For minorities, the annual return for just having a baccalaureate degree is approximately 13 percent, and this increases to approximately 17 percent and 11 percent for graduating from a college/university ranked very good and good respectively.

As  $ATE = ATET \times \text{Prob}(S = 1) + ATENT \times \text{Prob}(S = 0)$ , that ATET is not significantly different from zero for all three treatments for minorities provides insight into why relative to the Han majority, the average labor market return to a baccalaureate degree is lower. The ATENT, which is statistically significant for minorities, is the labor market return the control group—minority high school graduates—would realize had they earned a baccalaureate degree. This suggests that one reason why the labor market return on a baccalaureate for minorities is low relative to the Han majority is that colleges/universities have not fully exploited a pipeline of minority students who could earn and benefit from a baccalaureate degree. Indeed, to the extent that the ATENT is an increasing function of the number of high school graduates, the low return to a baccalaureate degree for minorities could also reflect a constrained supply of minority high school graduates.

## V. Conclusion

This paper considered the extent to which the labor market returns to a baccalaureate degree, and its quality is conditioned on ethnicity in China. Data from the 2002 Chinese Household Income Project are utilized to estimate the labor market return to graduating from college relative to high school. We estimated three treatment parameters that enable identification of the returns to a baccalaureate degree for minorities in China, and how it varies by the quality of the institution awarding the baccalaureate degree. Parameter estimates reveal that for minorities, the average treatment effect is low relative to the Han majority, nonexistent for those actually receiving the treatment, and would be positive for those who could have earned a baccalaureate degree but did not. Our findings provide empirical support for the conjecture of Hannum (2002) that the returns to education are low—in this case relative to the Han majority and in the case of a baccalaureate degree. Our results suggest that while post-reform era higher education and labor market policy in China may

have been effective at narrowing the college completion and employment disparity between minorities and the Han majority (Zang, 2008) existing disparities can be eliminated by further expanding the pipeline of minorities that complete high school and enter into colleges/universities that grant baccalaureate degrees.

There are at least two limitations of our analysis. First, our results are based on a cross section of China's labor market in 2002. Since that time, the Chinese economy has grown substantially, and it is possible that in response to such growth, the pipeline of minorities into colleges/universities and the labor market has been enhanced in such a way the labor market returns on a baccalaureate degree for minorities has converged to that of the Han majority. As such, our findings could just be a transitory snapshot of a labor market that no longer exists. Lastly, our identification strategy has no exclusion restrictions on the selection mechanism, and we appealed to the use of bootstrapped standard errors to ameliorate and/or eliminate the possible specification bias. This is also similar to not having suitable instruments—for which we could not find in our data. However, our results indicate that OLS is downwardly biased, which is a similar finding when estimating earnings equations with instrumental variables. This suggests that our identification strategy does not introduce any bias in our estimates of the treatment effects—the labor market return—of earning a baccalaureate degree.

**Table 1**  
**Covariate Summary**

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Variable	Mean	Standard Deviation	Number of Observations
Annual Earnings <sup>a</sup>	10663.54	8296.35	3779
Years of Labor Market Experience	19.47	8.79	3779
Male <sup>b</sup>	.559	.486	3779
Member of Communist Party <sup>b</sup>	.291	.454	3779
Employed In Manufacturing Sector <sup>b</sup>	.242	.428	3779
Employed In State-owned Enterprise <sup>b</sup>	.321	.467	3779
Graduated From College <sup>b</sup>	.255	.436	3779
Graduated From College Ranked Very Good <sup>b</sup>	.039	.194	2930
Graduated From College Ranked Good <sup>b</sup>	.102	.303	3136
Minority <sup>b</sup>	.034	.181	3779

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Source: *Chinese Household Income Project, 2002*

Notes:

<sup>a</sup> Annual earnings (Yuan) is defined as Total income less the sum of bonuses, allowance/subsidies, price subsidies, local subsidies, living hardship subsidies, and subsidies for minimum living standard.

<sup>b</sup> Binary/dichotomous indicator.

**Table 2**  
**The Returns To A Baccalaureate Degree For Minorities In China**  
**Treatment Effect Parameter Estimates:**

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<b>Treatment Effect:</b>	<i>ATE</i> (OLS)	<i>ATE</i> (Heckit)	<i>ATE</i> (Heckit Minority)	<i>ATE</i> (Heckit Minority)	<i>ATE</i> (Heckit Minority)
<b>Outcome:</b> Log of Annual Earnings					
<b>Control Group:</b> High School Graduates					
<b>Treatment:</b>					
Graduated from College	.399 (.026) <sup>a</sup>	.605 (.201) <sup>b</sup>	.504 (.276) <sup>c</sup>	.443 (.368)	.525 (.249) <sup>b</sup>
Number Of Observations:	3779	3779	3779	3779	3779
Graduated from College: (Rank = Very Good)	.443 (.073) <sup>a</sup>	.816 (.324) <sup>b</sup>	.668 (.383) <sup>c</sup>	-.724 (1.03)	.725 (.373) <sup>c</sup>
Number Of Observations:	2930	2930	2930	2930	2930
Graduated from College: (Rank = Good)	.473 (.038) <sup>a</sup>	.511 (.206) <sup>b</sup>	.449 (.240) <sup>c</sup>	.313 (.467)	.464 (.221) <sup>b</sup>
Number Of Observations:	3136	3136	3136	3136	3136

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Standard errors in parentheses.

<sup>a</sup> Significant at the .01 level

<sup>b</sup> Significant at the .05 level

<sup>c</sup> Significant at the .10 level

## References

- Becquelin, Nicolas. 2000. "Xinjiang in the Nineties," *The China Journal*, 44: pp. 65 - 90.
- Card, David. 1999. "The Causal Effect of Education on Earnings," in Orley Ashenfelter, and David Card (Eds.), *Handbook of Labor Economics*, vol. 3b, North Holland, Amsterdam NL.
- Efron, Bradley and Robert J. Tibshirani. 1993. *An Introduction to the Bootstrap*, Chapman and Hall, New York, NY.
- Goncalves, Silvia and Halbert White. 2005. "Bootstrap Standard Error Estimates For Linear Regression," *Journal of the American Statistical Association*, 100: pp. 970 -979.
- Gustafsson, Bjorn and Ding Sai. 2009a. "Villages Where China's Ethnic Minorities Live," *China Economic Review*, 20: pp. 193 - 207.
- Gustafsson, Bjorn and Ding Sai. 2009b. "Temporary and Persistent Poverty Among Ethnic Minorities and the Majority in Rural China," *Review of Income and Wealth*, 55, pp. 588 - 606.
- Gustafsson, Bjorn and Li Shi. 2003. "The Ethnic Minority-Majority Income Gap In Rural China During Transition," *Economic Development and Cultural Change*, 51: pp. 805 - 822.
- Hannum, Emily. 2002. "Educational Stratification by Ethnicity in China: Enrollment and Attainment in the Early Reform Years," *Demography*, 39: pp. 95 - 117.
- Hannum, Emily and Yu Xie. 1998. "Ethnic Stratification in Northwest China: Occupational Differences Between Han Chinese and Ethnic Minorities in Xinjiang, 1982 - 1990," *Demography*, 35: pp. 323 - 333.
- Heckman, James J. and Xuesong Li. 2004. "Selection Bias, Comparative Advantage and Heterogeneous Returns to Education: Evidence From China in 2000," *Pacific Economic Review*, 9: pp. 155 - 171.

- Hoogerheide, Lennart., Joern H. Block, and Roy Thurik. 2012. "Family Background Variables as Instruments for Education in Income Regressions: A Bayesian Analysis," *Economics of Education Review*, 31: pp. 515 - 523.
- Jin, Song., Terry Sicular, and Yue Ximing. 2013. "The 2002 and 2007 CHIP Surveys: Sampling Weights, and Combining the Urban, Rural and Migrant Samples," in Li Shi, Hiroshi Sato, and Terry Sicular (eds.), *Rising Inequality in China: Challenges to a Harmonious Society*, Appendix II, Cambridge University Press, Cambridge UK.
- Johnson, Emily N. and Gregory C. Chow. 1997. "Rates of Return to Schooling in China," *Pacific Economic Review* 2: pp. 101- 113.
- Li, Haizheng. 2003. "Economic Transition and Returns to Education in China," *Economics of Education Review*, 22: pp. 317 - 328.
- Li, Hongbin., Pak Wai Liu, and Junsen Zhang. 2007. "Economic Returns To Communist Party Membership: Evidence From Urban Chinese Twins," *Economic Journal*, 117: pp. 1504 - 1520.
- Maurer-Fazio, Margaret., James W. Hughes, and Dandan Zhang. 2010. "A Comparison and Decomposition of Reform-era Labor Force Participation Rates of China's Ethnic Minorities and Han Majority," *International Journal of Manpower*, 31: pp. 138 - 162.
- Mishra, Vinod and Russell Smyth. 2010. "Economic Returns To Schooling For China's Korean Minority," Discussion Paper 37/10, Department of Economics, Monash University, Victoria AU.
- Puhani, Patrick A. 2000. "The Heckman Correction for Sample Selection and its Critique," *Journal of Economic Surveys*, 14: pp. 53 - 68.
- Rong, Xue Lan and Tianjian Shi. 2001. "Inequality in Chinese Education," *Journal of Contemporary China*, 10: pp. 107 - 124.
- Shi, Li. 2002. *Chinese Household Income Project*, [Computer file]. ICPSR21741-v1. Ann Ar-

bor, MI: Inter-university Consortium for Political and Social Research [distributor], 2009-08-14.  
doi:10.3886/ICPSR2174.

Wu, Xiaogang. 2010. "Economic Transition, School Expansion, and Educational Inequality in China, 1990 - 2000," *Research in Social Stratification and Mobility*, 28: pp. 91 - 108.

Xiaowei, Zang and Li Lulu. 2001. "Ethnicity and Earnings Determination in Urban China," *New Zealand Journal of Asian Studies*, 3: pp. 34 - 48.

Yee, Herbert S. 2003. "Ethnic Relations in Xinjiang: A Survey of Uygur-Han Relations in Urumqi," *Journal of Contemporary China*, 12: pp. 431 - 452.

Zang, Xiaowei. 2008. "Market Reforms and Han-Muslim Variation in Employment in the Chinese State Sector in a Chinese City," *World Development*, 36: pp. 2341 - 2352.

Zhong, Hai. 2011. "Returns To Higher Education in China: What is the Role of College Quality?" *China Economic Review*, 22: pp. 260 - 275.