The Changing Pattern of Wage Returns to Education in Post-Reform China*

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Abstract: This paper examines the labor market returns to schooling in China during 2010-2015 by using two rounds of the China General Social Survey data. While our OLS estimates based on Mincerian earnings function confirm the importance of human capital in China's post-reform economy, they highlight a number of important changes in the labor market performance of educated workers. First, the average returns to schooling has declined during the study period, albeit modestly, from 7.8% to 6.7%. Second, the fall in returns is much larger in urban locations, coastal regions and among women (from 12.2%, 10.7% and 9% to 9.1%, 8.6% and 6.9% respectively). Workers with university diplomas and good English language skill continue to enjoy a high return. These findings are unchanged regardless of model specifications and corrections for endogeneity bias using conventional as well as Lewbel instrumental variable approaches. We conclude by discussing the potential explanations for the observed changes and their policy implications.
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Key words: Gender gap; Schooling; English-language Premium; Selection Bias; Post-reform China.
JEL code: I26, J30

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1. Introduction

China's economy grew at historically unprecedented rates during 1980 to 2010. The country's transition to a market economy was facilitated by a wide range of economic reforms introduced in the 1980s and 1990s. During the planning era, wages were low because of the country's socialist labor system which suppressed returns to schooling (Chen and Feng 2000; Demurger, 2001; Fleisher and Wang, 2004). In post-reform years, substantial physical capital investment and the relocation of labor and capital through privatization and market liberalization increased the demand for skills and schooling (Meng et al 2013). Consistent with the experience of other Central and East European countries that went through the transition from a planned economy to a market economy, China also experienced rising returns to education in post-reform years (Zhao and Zhou, 2002; Hung, 2008; Heckman and Yi, 2012). Evidence from growth accounting studies also confirm that accumulation of human capital during 1980-2010 contributed significantly to economic growth (Yan and Yudong 2003; Whalley and Zhao 2013).

Higher returns to schooling post-reform China induced major educational expansions. During 2000s college enrollment increased five to six folds (Whalley and Zhao 2013; Knight, Deng & Li 2017). In a competitive labor market, this would imply greater selection by employers and higher returns to labor quality. In spite of the financial crisis of 2008, China's economy continued to grow sustaining the demand for skilled labor. However, there are emerging concerns about declines in economic growth rates and productivity (Perkins 2015). After years of high growth, China's economy is slowing down. Recent statistics show that total factor productivity (TFP) in the China's industrial sector has been extremely low, while manufacturing production has been dominated by labor-intensive production techniques (Wu, Ma, and Guo 2014). Some scholars have predicted a further decline in the country's average potential GDP growth over the coming decade (Eichengreen, Park, & Shin, 2012; Jong-Wha 2017). Therefore, it is important to study changes, if any, to rewards for schooling and cognitive skills in rural and urban locations in order to understand how the labor market adjusted to the educational supply shock as well as other shifts in China's economy.

There is a sizable literature discussing changes in returns to education in post-reform China (e.g. Bishop & Chiou 2004; Appleton, Song & Xia 2005; Bishop, Luo & Wang 2005; Hauser & Xie 2005; Knight & Li 2005; Yang 2005; Wang 2013). Most of the estimates of labor market returns correspond to 1990s and early 2000s. Studies examining changes in returns to education in post-2000 period are limited. The available studies indicate a slow-down in micro returns to education by 2008, the year when the global recession hit China (e.g. see Liu and Zhang 2013). Therefore, we add to the extant literature by using two recent rounds of the China General Social Survey (CGSS) data set and provide an update on changes in the labor market returns to education in China. In terms of methodology, we estimate Mincerian earnings function with extensive controls for various determinants of earnings including indicators of health status such as height and body-mass index. Although schooling is expected to capture returns to human capital, it may be an imperfect measure of cognitive skills (Asadullah and Chaudhury 2015; Hanushek *et al*., 2015). Therefore our model also includes a measure of English language proficiency. The empirical analysis additionally addresses concerns over the endogeneity of schooling variable in earnings functions and possible non-random selection into waged work.

The rest of the paper is organized as follows. Section 2 describes the study background and briefly reviews the available studies researching changes in returns to education in China.

Section 3 describe the data while Section 4 explains the empirical framework. Section 5 discusses the main results. Section 6 is conclusion.

2. Study context: Labor market changes in post-reform China

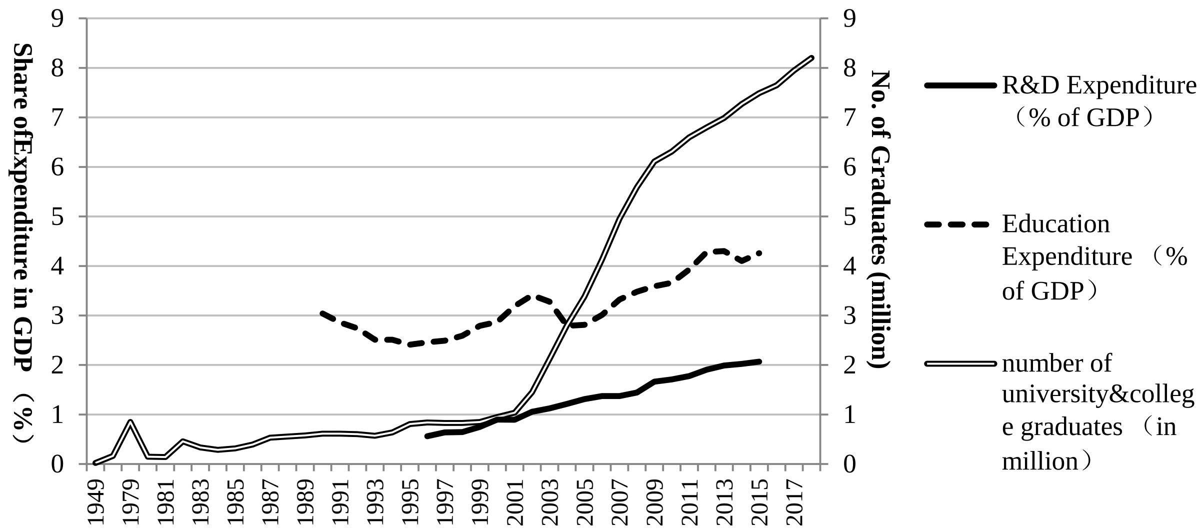
The Chinese labor market underwent significant structural changes in post-1978 period. In pre-reform years, wages were administratively set which suppressed the true returns to cognitive skills and schooling. The allocation of labor was planned whereby the state sector accounted for most of the jobs. Experience was over-rewarded; payments for seniority were a central feature of the pre-reform wage structure. In post-reform period, privatization and market liberalization along with the improvement in workers' contractual rights (Chan and Nadvi, 2014) facilitated farm to non-farm transition and encouraged labor migration from rural to urban locations. Market liberalization also attracted foreign direct investment and multinational companies, leading to particularly strong demand for skilled workers along the rapidly expanding industrial coast (Liu, Xu and Liu 2004; Su and Liu 2016; Salike 2016). Skill-biased technological change favored educated workers. Owing to higher pay for basic labor as well as an increase in returns to schooling, the average real wage increased by 202 between 1992 and 2007 (Ge and Yang 2014).

Following China's shift from an administratively determined wage system to a market-oriented one in the early 1990s, there has been a significant increase in research on economic returns to schooling. While numerous studies have employed Mincer-type earnings function approach, they differ in terms of methods, data sources and study periods. The majority used household survey datasets such as the Chinese Household Income Project (CHIP) data set, China Health and Nutrition Survey (CHNS) data set, China Urban Labor Survey (CULS) data set and Urban Household Survey (UHS) data sets. The most common method is ordinary least squares (OLS), based on which returns are higher in urban area and higher for female workers than that for male employees. For pre-reform period, the OLS estimates of the rate of return is around 1.4-1.9% in urban area vs 0.0-2.6% in rural area. In post-reform period, the estimated return shows an increase to 3.3-9.0% for the full sample, 1.5-12.1% for urban sample and up to 4.8% for rural sample. Some researchers have modeled schooling attainment as an endogenous determinant of earnings by employing instrumental variable (IV) techniques.[1] Studies implementing the IV procedure mostly use non-experimental data whereby family background, parents' education and spouse's education are used as instruments for education (for further details and review of the literature on China, Liu and Zhang (2013); Awaworyi and Mishra (2014) and Xiao and Asadullah (2018)). IV estimates of returns to schooling usually yield higher estimates than OLS estimates.[2]

Figure 1: Trends in R&D Ratio, Education Expenditure Ratio and Number of University & College Graduates

[1] Others have accounted focused on non-random selection into wage work by employing Heckman's (1979) two-step procedure (see Xiao and Asadullah 2018 for details).

[2] For instance, for the full sample, reported IV estimates range between 4.2 and 22.9% for urban sample.



Data Sources: (1) Data for Number of University & College Graduates collected from Ministry of Education, China; (2) Data for R&D Ratio collected from the UNESCO Institute for Statistics Database; 3) Data for Education Expenditure Ratio collected from NBS (various years).

The majority of the available studies however report estimates at a point in time. It is important to evaluate changes over time because structural reforms of China's economy have coincided with a significant jump in educational attainment and greater policy focus on R&D. Data also shows significant increase in state funding for R&D, from 1.71% of GDP in 2010 to 2.07% in 2015 (see Figure 1). The share of education expenditure in GDP has been also approaching the level of developed countries (Song, Garnaut, Fang, and Johnston, 2017). School enrolment and literacy rates increased rapidly, particularly among younger workers (Bosworth and Collins, 2008), which can be seen as a supply side shock to the labor market. But the long-term consequences of this shock is not fully understood particularly because of lags in market adjustments.

This period also saw demand side shocks such as the global Financial Crisis which caused recessions in many emerging economies. In the case of China, the government's stimulus package introduced in 2008 helped sustain investment-driven macroeconomic growth and the demand for skilled labor (Zilibotti, 2017).[3] However, there are signs of growth slowdown of GDP growth. Available evidence based on labor market indicators indicates a reduction in relative wages and an increase in unemployment rate (Knight, Deng & Li 2017).

The rapid growth also created regional inequalities. According to one study (Meng et al. 2013), the average real earnings of urban male workers increased by 350% during 1988-2009 while the variance in log earnings also increased significantly. Evidence also indicates significant rural-urban inequality in the education performance of children (Zhang et al 2015). In this context, it is also important to understand changes in the way education is rewarded across rural and urban locations and coastal and interior cities.

There is a growing literature discussing changes in returns to education in China during the 1990s (e.g. Bishop & Chiou (2004), Appleton, Song & Xia (2005), Bishop, Luo & Wang (2005), Hauser & Xie (2005), Knight & Li (2005), Yang (2005), Wang (2013). A recent

[3] This also included a new labor law, which provided a much higher standard of salaries and welfare to workers.

review of the literature on the returns to education for the period 1980-2016 identified 21 studies in total that used multiple rounds of data to document changes (for details, see Xiao and Asadullah 2018). A stylized fact is that the returns to education in the Chinese labor market in the 1980s and early 1990s were extremely low compared to other Asian countries and low and middle income countries in general (Psacharopoulos, 1994). But this changed since the mid-1990s with the estimated returns rising close to 10% by 2010 Xiao and Asadullah 2018). Another stylized fact is that female workers benefited more of university education than men while urban residents are rewarded much higher than rural residents who have the same level of college degree (Wang, 2012). Among other findings, the pattern of returns to education in different regions has also changed. In contrast to the finding, the rate of return became higher in less-developed province than that in high-income province (Li 2003). Compared to those from pre-higher-education reform period, Studies also confirm a sharp increase in returns to college education (Bishop and Chiou, 2004). However, studies examining changes in returns to education in post-2000 period are limited. Qu & Zhao (2016) studied returns in rural China during the period 2002-2007 and reported returns to fall. There is no study documenting changes in both rural and urban China particularly for the period 2010-2015. It is in this aspect that we contribute to the extant literature.

3. Data Source and Descriptive Statistics

In this paper, we use data from the 2010 and 2015 rounds of China General Social Survey (CGSS). The CGSS 2010 sampled a total of 11783 individuals whereas CGSS 2015 contains data on 10968 individuals. The main advantage of CGSS over other survey datasets is that it is representative of rural and urban locations and contains information on language skill of sample respondents and their health status. CGSS data also contains retrospective information on parental background of all respondents which helps produce additional estimates of returns to education based on different econometric methodology. After discarding cases with missing data and restricting observations to waged workers, our working sample contains 4223 and 3438 individuals in 2010 and 2015 samples respectively. **Table 1** summarizes all variables used in the regression analysis.

Table 1: Descriptive Statistics

	2015		2010	
	Mean	**SD**	**Mean**	**SD**
Monthly Employment Income (in RMB)	3065.20	4113.52	1631.37	2283.98
Personal Characteristics				
Years of Experience	28.02	10.35	27.86	10.06
Female (yes=1)	0.43	0.49	0.43	0.49
Minority (yes=1)	0.09	0.28	0.10	0.30
Non-agricultural *Hukou* (yes=1)	0.35	0.48	0.40	0.49
Currently married (yes=1)	0.87	0.34	0.90	0.31
Schooling and cognitive skills				
Years of Education (years of schooling)	10.19	4.29	9.70	4.45
Level of Education:				
Bachelor and above	0.15	0.35	0.11	0.31
Semi-bachelor	0.10	0.31	0.11	0.31
Senior secondary	0.18	0.39	0.19	0.39
Junior secondary	0.32	0.46	0.30	0.46
Primary and below (base group)	0.25	0.43	0.29	0.45
Good English Skill (at/above standard=1)	0.15	0.35	0.11	0.32
Health Capital				
Height (in cm)	166.05	7.52	165.39	7.49
Self-reported Health Status:				
Bad	0.10	0.29	0.12	0.32
Normal (base group)	0.19	0.39	0.21	0.40
Good	0.71	0.45	0.67	0.47

Body Mass Index (BMI):				
BMI<18.5, Underweight	0.07	0.25	0.07	0.25
18.5≤BMI<25, Normal (base group)	0.71	0.46	0.72	0.45
25≤BMI<30, Overweight	0.20	0.40	0.20	0.40
BMI≥30, Obese	0.02	0.15	0.02	0.14
Instruments for IV model				
$Education_{Father}$ (in years)	5.56	4.61	5.28	4.61
$Education_{Mother}$ (in years)	4.01	4.41	3.38	4.30
Parent died when respondent was 14 year-old (yes=1)	0.32	0.18	0.03	0.18
Geographic Location				
Rural (yes=1)	0.43	0.49	0.46	0.50
East of China	0.42	0.49	0.38	0.48
Middle of China	0.33	0.47	0.34	0.47
West of China	0.25	0.43	0.28	0.45
N	3438		4223	

CGSS data also confirms economy wide changes that have been highlighted by other studies in the literature. The share of people of working age in China's population has been also falling since 2012 (Song, Garnaut, Fang, and Johnston, 2017). This is owing to a combination of population ageing and rising educational participation (also see Figure 1). To verify the trends in our data, **Appendix Table 1** describes sample composition across different groups and work status: waged agricultural work, waged non-agricultural work, self-employed, in the labor force but unemployed and not in the labor force. Majority of former studies relies on the second age group, where female aged 16-55 and male aged 16-60 (16 year-old is the lowest legal working age in China, 55 and 60 are the official retirement age).[4] In 2015 sample, unemployment rate and proportion of workers outside the labor market is higher. This is also true for females. These patterns are consistent with (Dasgupta, Matsumoto and Xia (2015) who also confirm a decline in LFPR during the period 1990-2013. This is owing to sharp decline in the participation rate of young men and women between 1990 and 2010, partly because many younger members of the work force are studying longer. There has been a sharp expansion of higher education in China beginning in 1999. The reported unemployment trends in Appendix Table 1 is also consistent with the available evidence on the rise in unemployment rate among young college graduates (Li, Whalley and Xing 2014).

IV. Econometric Framework

We specify a Mincerian earnings function where the dependent variable is log of monthly employment income (measured in RMB). The key independent variables are years of schooling, experience[5], experience squared, gender, marital status and a series of additional control variables - ethnicity, *hukou* type, marital status, physical height, self-reported health status, BMI index and proficiency in English. Equation (1) summarizes the earnings model which we estimate using the ordinary least square (OLS) technique separately for 2010 and 2015 data:

$$\ln W_i = a_0 + a_1 EXP_i + a_2 EXP_i^2 + a_3 X + a_4 EDU_i + a_5 LAN_i + a_6 HEALTH_i + \epsilon_i \quad (1)$$

where lnW is (log) monthly wage and X is a vector of individual characteristics including gender, ethnicity, hukou (household registration status) type, marital status and geographic

[4] We follow Schultz (2002) and restrict the analysis to women aged 25-55 years and men aged 25-60 years.
[5] In the absence of data on work experience or tenure, we use information on age and school completion to define post-school experience.

location (rural vs urban, coastal vs interior provinces). EXP represents number of years of job experience, EDU denotes years of schooling, cognitive skills (having good English skill or not – LAN), three proxies of health capital (height, self-reported status and body-mass index dummies – HEALTH) and ϵ is the error term.

As explained in section 2, many studies recognized that schooling could be endogenous owing to omission of unmeasured component of human capital. To address this problem, researchers have estimated instrumental variable models. Therefore we additionally estimate a version of equation (1) that accounts for endogeneity of the schooling variable in the earnings function. The estimable equation is as follows:

$$\ln W_i = \beta_0 + \beta_1 EXP_i + \beta_2 EXP_i^2 + \beta_3 X + \beta_4 \widehat{EDU_i} + \beta_5 LAN_i + \beta_6 HEALTH_i + \in_i \qquad (2)$$

We do so following two approaches. First is the conventional IV method that relies on external instruments for the variable, schooling completed. . In CGSS data, there are three variables that are potential instruments: (a) whether parents died when the respondent was 14 year-old, (b) father's education and (c) mother's education[6]. The approach to estimating equation (2) follows Lewbel's method that relies on heteroscedasticity in the data. According to Lewbel's (2012) method, when Z is a vector of observed exogenous variables, [Z-E(Z)] ξ_2 can be used as an instrument if $E(\mathrm{X}\xi_1) = 0, E(\mathrm{X}\xi_2) = 0, cov(Z, \xi_1, \xi_2) = 0$ (where ξ_1 and ξ_2 are error terms specific to final and first stage regressions respectively) and there is some heteroskedasticity in ξ_j i.e. cov (Z, ξ_2^2) $\neq 0$. In this paper we follow the standard approach in existing studies to present results based on Z=all of X, since the Lewbel (2012) estimates are potentially sensitive choice of Z and there are no accepted approaches for the optimal selection of Z. Lewbel (2012) method has two main advantages, one is to be used to obtain IV estimates if conventional IVs are not included in the datasets, the other one is to be used to confirm whether the conventional IVs included in the datasets can satisfy the exclusion criteria. So here in this paper, we are taking the second advantage of this method since our CGSS contains data for several conventional IVs as mentioned earlier. While the Lewbel (2012) estimates may not be reliable as those produced with valid conventional IVs, the limited available evidence (Sabia, 2007; Belfield and Kelly, 2012; Kelly *et al.*, 2014) suggests that the estimates are close to those obtained with good IVs.

5. Main Results

5.1 OLS Estimates of Returns to Education

Table 2 reports OLS estimates of returns to education separately for 2010 and 2015. Two specifications are reported for each year. The first is a parsimonious version of equation (1) which only controls for experience, experience squared, gender, ethnicity, type of *hukou*, martial status, years of schooling and location dummies. The second one corresponds to full specification as outlined in equation (1), in particular additionally controlling for a measure of English language skill.[7]

Table 2: OLS Estimates of the Determinants of Earnings with and without Controls for Language Skill and Health Endowments (full sample)

	2015	2010

[6] For studies using data on the timing of parental death as instrument for schooling status, see Case, Paxson and Ableidinger (2004) and Gertler, Levine and Ames (2004).

[7] English language skill is measured as a binary indicator and refers to proficiency at or above the standard level.

	(i)	(ii)	(i)	(ii)
Personal Characteristics				
Experience	.012*	.020***	.004	.008
	(1.71)	(2.86)	(0.59)	(1.20)
Experience square	-.001***	-.001***	-.001	-.001**
	(3.47)	(4.15)	(1.01)	(2.19)
Female	-.415***	-.339***	-.376***	-.235***
	(14.78)	(8.63)	(14.64)	(6.75)
Minority	-.203***	-.206***	-.002	-.011
	(4.00)	(4.08)	(0.04)	(0.27)
Non-agricultural *Hukou*	.096**	.078**	.205***	.173***
	(2.56)	(2.08)	(5.59)	(4.76)
Currently married	.092**	.079*	.055	.048
	(2.16)	(1.85)	(1.29)	(1.15)
Schooling and cognitive skills				
Years of Education	.076***	.067***	.088***	.078***
	(16.35)	(14.01)	(20.98)	(18.16)
Good English Skill		.189***		.307***
		(4.15)		(6.94)
Health Capital				
Height, in cm		.008***		.014***
		(2.98)		(5.84)
Self-reported Health Status:				
Bad		-.193***		-.179***
		(3.59)		(3.95)
Good		.131***		.112***
		(3.69)		(3.60)
Body Mass Index (BMI):				
BMI<18.5, Underweight		-.005		-.061
		(0.09)		(1.24)
25≤BMI<30, Overweight		.013		.002
		(0.39)		(0.07)
BMI≥30, Obese		.083		-.147*
		(0.92)		(1.68)
Geographic Location				
Rural	-.413***	-.402***	-.413***	-.413***
	(11.33)	(11.12)	(11.33)	(11.50)
East of China	.285***	.275***	.285***	.371***
	(8.52)	(8.25)	(8.52)	(12.00)
West of China	-.205***	-.173***	-.205***	-.021
	(5.48)	(4.64)	(5.48)	(0.66)
Constant	6.998***	5.510***	6.998***	3.773***
	(62.30)	(11.88)	(62.30)	(9.19)
N	3438	3438	4223	4223
Adj R-squared	0.43	0.45	0.49	0.51

Note: a. Data is from the Chinese General Social Survey (CGSS); b. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively; c. Good English skill is a dummy variable which indicates whether the English skill (including speaking and listening) of the respondent is at/above the standard proficiency level (=1) or not (=0); d. For self-reported health status, the reference category is 'in normal health condition'; e. For Body Mass Index (BMI), the reference category is 'normal, 18.5≤BMI<25'; f. For regional dummies, the reference group is 'middle area of China'.

First of all, education has a significantly positive impact on earnings in China even after we control for foreign language proficiency and health capital (model 2). The rate of returns to an additional year of schooling ranges between 8.8% and 7.8% for 2010 round (between 7.6% and 6.7% for 2015 round) in the full sample. Second, we find a significant and positive correlation between English language proficiency and wages in China. However, compared to 2010, the estimated wage premium associated with English language skill also declined from 30% to 18.9% in 2015. Third, health capital matters for wage earnings. The OLS estimates suggest that an additional centimeter of adult height is associated with 1.4% in 2010 (0.8% in 2015) higher wage in the full sample.

5.2 Additional estimates: Returns to Education and Language Skill by Gender and Location

Next, we explore two particular channels through which returns to skills and schooling may have changed in post-reform years. First, we re-estimate returns to education and language skill for all sub-samples. Second, we re-estimate the returns to different levels of education vis-a-vis language skills for full and all sub-samples as well. **Table 3** repeats the analysis presented in **Table 2** for various sub-samples but only results specific to the education and language skill variables are reported. The sub-samples are female, male, urban, rural, eastern area, middle area and western area. First of all, we find that the returns to education among female workers has declined from 9.0% in 2010 to 6.9% in 2015. This has narrowed the female advantage in returns over males; in 2015 data, male workers enjoyed a 6.1% returns to an extra year of schooling. Second, the returns to good English skill among women has declined from 36% in 2010 to 14% in 2015. This has reversed the pre-existing female advantage in English language wage premium; in 2015, men with English skill enjoy higher earnings compared to women. Third, there is a clear rural-urban gap in returns. Between 2010 and 2015, the returns to schooling has declined from 12.2% to 9.1% in urban locations. Nonetheless, education is still poorly rewarded in rural areas where the estimated returns in 2015 is as low as 3%.

Table 3: OLS Estimates of the Returns to Education & English-Language Skill by Gender, Locations & Cohorts

		2015		2010	
		(i)	(ii)	(i)	(ii)
Female					
	Years of Education	.076***(10.48)	.069*** (9.24)	.103*** (16.13)	.090***(13.80)
	Good English Skill		.143** (2.23)		.362*** (5.67)
	Adj R-squared	0.48	0.49	0.51	0.53
	N	1492	1492	1797	1797
Male					
	Years of Education	.071*** (11.32)	.061*** (9.44)	.079*** (13.67)	.071*** (12.00)
	Good English Skill		.214*** (3.29)		.232*** (3.80)
	Adj R-squared	0.37	0.38	0.45	0.47
	N	1496	1496	2426	2426
Urban					
	Years of Education	.098*** (19.68)	.091*** (17.41)	.132*** (26.64)	.122*** (23.51)
	Good English Skill		.135*** (3.28)		.208*** (4.92)
	Adj R-squared	0.37	0.37	0.43	0.45
	N	1954	1954	2288	2288
Rural					
	Years of Education	.039*** (4.59)	.030*** (3.45)	.026*** (3.75)	.022*** (3.22)
	Good English Skill		.334** (2.26)		.285** (1.86)
	Adj R-squared	0.25	0.27	0.19	0.23
	N	1484	1484	1935	1935
Provinces: Eastern					
	Years of Education	.097*** (14.73)	.086*** (12.43)	.122*** (18.32)	.107*** (15.41)
	Good English Skill		.190*** (3.60)		.304*** (5.46)
	Adj R-squared	0.39	0.41	0.44	0.46
	N	1443	1443	1586	1586
Middle					
	Years of Education	.052*** (6.08)	.046*** (5.13)	.063*** (8.76)	.056*** (7.69)
	Good English Skill		.091 (0.98)		.196** (2.19)
	Adj R-squared	0.29	0.29	0.34	0.37
	N	1128	1128	1435	1435
Western					
	Years of Education	.067*** (6.98)	.063*** (6.50)	.060*** (7.44)	.054*** (6.77)
	Good English Skill		.139 (0.94)		.230** (1.98)
	Adj R-squared	0.34	0.36	0.42	0.45
	N	867	867	1202	1202
Cohorts: Pre-Higher Education Expansion					

Cohort					
	Years of Education	.069*** (12.78)	.061***(10.99)	.087***(19.55)	.076***(16.93)
	Good English Skill		.242*** (3.90)		.350***(6.80)
	Adj R-squared	0.43	0.44	0.48	0.50
	N	2620	2620	3766	3766
Post-Higher Education Expansion Cohort					
	Years of Education	.104*** (10.44)	.097***(8.93)	.132***(8.49)	.118***(7.11)
	Good English Skill		.079 (1.15)		.153*(1.77)
	Adj R-squared	0.35	0.35	0.43	0.45
	N	818	818	457	457

Note: a. Data is from the Chinese General Social Survey (CGSS); b. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively; c. Good English skill is a dummy variable which indicates whether the English skill (including speaking and listening) of the respondent is at/above the standard proficiency level (=1) or not (=0); d. Full specifications for models (i) and (ii),- please see Table 2; e. Pre-higher education expansion cohort indicates individual who was older than 18-year old in 1999, while post-higher education expansion cohort indicates individual who was at or younger than 18-year old in 1999.

Similarly, we find significant regional differences in the returns to education. The next three panels of **Table 3** report estimates by region. We find that the eastern region (i.e. coastal provinces) continue to enjoy higher rate of returns to schooling (10.7% in 2010 vs. 8.6% in 2015) compared to the inner (5.6% vs. 4.6%) and western regions (5.4% vs. 6.3%). This is consistent with other studies in the literature (e.g. see Liao and Zhao 2013; Qian and Smyth, 2008; Cheng, 2009; Bickenbach and Liu, 2013; Yang, Huang and Liu, 2014; Whalley and Xing, 2014; Zhong 2011). Additionally, we also report estimates for the pre-higher education expansion cohort versus the post one. Results shows that people from post-higher education expansion cohort enjoyed higher rate of returns to education than the pre-cohort for both years, though the gap between these two cohort groups is getting smaller across 2010-2015 period. Moreover, the estimated wage premium associated with English language skill declined from 35% in 2010 to 24.2% in 2015 for the pre-higher education expansion cohort, and it even got disappeared in 2015 for the post-higher education expansion cohort. This result is somehow in line with the policy shift in China. Although increasing importance has been attached to proficiency in English in hiring decisions in China (Jin and Cheng, 2013), recently the central government has moved to reduce what it receives as an over-emphasis on English proficiency in the curriculum. Hence, for example, the weight on English proficiency tests in high school and college entrance exams will be reduced in some provinces from recent years (Guo and Sun, 2014).

Table 4: OLS Estimates on returns to schooling by levels of education (full sample & sub-samples)

		2015	2010
Full			
	Junior secondary	.216*** (5.40)	.149*** (4.29)
	Senior secondary	.405*** (8.26)	.453*** (10.53)
	Semi-bachelor	.696*** (11.40)	.872*** (15.92)
	Bachelor and above	.989*** (15.70)	1.191*** (20.06)
	Adj R-squared	0.46	0.53
	N	3438	4223
Female			
	Junior secondary	.151** (2.42)	.149*** (2.83)
	Senior secondary	.419*** (5.03)	.582*** (8.40)
	Semi-bachelor	.681*** (7.18)	1.114*** (13.36)
	Bachelor and above	1.004*** (10.34)	1.501*** (16.23)
	Adj R-squared	0.50	0.56
	N	1492	1797
Male			
	Junior secondary	.213*** (3.99)	.126*** (2.72)

	Senior secondary	.355*** (5.75)	.366*** (6.58)
	Semi-bachelor	.666*** (8.23)	.693*** (9.44)
	Bachelor and above	.916*** (10.85)	.981*** (12.58)
	Adj R-squared	0.39	0.48
	N	1946	2426
Urban			
	Junior secondary	.229*** (3.97)	.237*** (4.13)
	Senior secondary	.602*** (10.04)	.467*** (7.70)
	Semi-bachelor	1.018*** (15.58)	.750*** (11.22)
	Bachelor and above	1.335*** (19.25)	1.061*** (15.58)
	Adj R-squared	0.45	0.38
	N	2288	1954
Rural			
	Junior secondary	.151*** (2.57)	.088* (1.88)
	Senior secondary	.248*** (2.87)	.251*** (3.51)
	Semi-bachelor	.665*** (3.75)	.665*** (3.23)
	Bachelor and above	.736*** (3.45)	.733*** (2.72)
	Adj R-squared	0.27	0.23
	N	1484	1935
East			
	Junior secondary	.141** (2.02)	.183*** (2.67)
	Senior secondary	.406*** (5.32)	.529*** (7.09)
	Semi-bachelor	.673*** (7.80)	.916*** (10.68)
	Bachelor and above	1.027*** (11.74)	1.296*** (14.51)
	Adj R-squared	0.42	0.48
	N	1443	1586
Middle			
	Junior secondary	.093 (1.44)	.097* (1.84)
	Senior secondary	.204** (2.49)	.306*** (4.42)
	Semi-bachelor	.539*** (4.62)	.704*** (7.23)
	Bachelor and above	.714*** (5.98)	.904*** (7.46)
	Adj R-squared	0.31	0.38
	N	1128	1435
West			
	Junior secondary	.383*** (4.90)	.137** (2.14)
	Senior secondary	.581*** (5.35)	.474*** (5.42)
	Semi-bachelor	.902*** (6.20)	.915*** (7.57)
	Bachelor and above	1.054*** (6.48)	1.018*** (7.77)
	Adj R-squared	0.37	0.46
	N	867	1202
Pre-Higher Education Expansion Cohort			
	Junior secondary	.174***(3.99)	.133***(3.69)
	Senior secondary	.354***(6.43)	.426***(9.50)
	Semi-bachelor	.703***(9.52)	.878***(14.90)
	Bachelor and above	.971***(12.72)	1.237***(19.05)
	Adj R-squared	0.45	0.52
	N	2620	3766
Post-Higher Education Expansion Cohort			
	Junior secondary	.459***(3.59)	.420**(2.42)
	Senior secondary	.654***(4.74)	.856***(4.26)
	Semi-bachelor	.844***(5.84)	1.067***(6.15)
	Bachelor and above	1.185***(8.05)	1.292***(6.15)
	Adj R-squared	0.36	0.45
	N	818	457

Note: a. Data is from the Chinese General Social Survey (CGSS); b. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively; c. Years of schooling variable has been replaced by education level dummies); d.. Full specification please see Model (ii) in Table 2; e. For level of education, the reference category is 'at/below primary level'; f. Pre-higher education expansion cohort indicates individual who was older than 18-year old in 1999, while post-higher education expansion cohort indicates individual who was at or younger than 18-year old in 1999.

Table 4 shows the returns to different level of education for full sample and seven sub-samples. The average rate of return r_i specific to each level is calculated using the following equation: $r_i = (\beta_i - =_{i-1})/(Y_i - Y_{i-1})$, where *i* is the level of education, Y_i is the year of schooling at education level *i* and t_i is the estimate of the coefficient on the corresponding education level dummy in the wage regression. The results show rising returns to education across levels. . Moreover, we also found that female workers benefited more from having higher education degree than men. Similarly, urban residents are rewarded more than rural residents with the same level of college education. If we look into the trend in returns to higher education (i.e. bachelor and above) during 2010-2015, there is a slight decrease from 31.9% to 29.3% for the full sample. Additionally, during the same period, women experienced a larger decline in the rate of return associated with bachelor or higher education (6.4%) when compared to men (3.8%). Educational endowment -- schooling as well as skills -- are distributed unequally in China. The averaged years of schooling in Shanghai area is 13.79 in 2010 (14.25 in 2015) which is clearly higher than that in full sample 9.70 (10.19), east area (including Shanghai) 11.63 (11.86), east area excluding Shanghai 11.41 (11.59), middle area 8.92 (9.52) and west area 8.09 (8.27). Moreover, the percentage of respondents that have good English skill in Shanghai is also higher 43.06% (56.16%) than that in full sample 11.20% (14.72%), east area including Shanghai 20.05% (24.88%), east area excluding Shanghai 17.75% (21.36%), middle area 6.27% (9.22%) and west area 5.41% (4.96%). Additionally, results also shows that the decline in rate of returns to schooling for both pre-expansion and post-expansion cohorts is mainly come from the higher education level between 2010 and 2015 where there is an increase in the junior secondary level. Moreover our findings on the higher rate of returns to schooling for college education from post-higher-education reform period compared those from pre-higher-education reform period is consistent with a large number of existing studies (Carnoy et al., 2013; Meng, Shen and Xue, 2013).

5.3 Robustness

In order to check whether our estimates imply a causal relationship between education capital and wages, we additionally present two sets of IV estimates of the earnings function. Full sample and sub-sample specific estimates of the returns to schooling based on OLS and IV models are presented in **Table 5**. Sub-sample specific results are presented in the bottom panels of the Table. As before, all regressions control for personal characteristics, location dummies, and health status. The IV estimates address potential endogeneity bias in the estimated returns to education.

In the OLS model, the estimated return equals to 7.8% in 2010 and 6.7% in 2015. Further, the result for the endogeneity test of column 2 rejects the null hypothesis that the OLS estimates are consistent. Using the whether parent has died when respondent was 14 year-old, father's education and mother's education as instruments, the IV rate of return yields a 20.9% in 2010 (16.4% in 2015), which is 13.1 (9.7) percentage points higher than the OLS return. Moreover, consistent with the international literature (see Mendolicchio and Rhein, 2014) we find that returns to education for female workers (OLS: 9.0% in 2010 vs. 6.9% in 2015; IV: 23.7% vs.

14.7%) is higher than that for male workers (OLS: 7.1% vs. 6.1%; IV: 17.9% vs. 17.5%) in both methods. The gender difference in returns to schooling increases by approximately 4% after correcting for endogeneity bias.

Table 5 also reports the returns to schooling for urban vs rural sample, coastal provinces vs inland provinces and pre vs post-higher-education expansion cohorts as well. Returns to schooling is also higher for urban workers (OLS: 12.2% in 2010 vs. 9.1% in 2015) than their rural counterparts (OLS: 2.2% vs. 3.0%) which is consistent with the earlier studies (Zhang, 2011) that reported clears gap in returns to education between urban and rural area. Once again, OLS estimate is smaller compared to IV estimate in all these sub-samples. In addition, the underestimation on the true rate of return for urban workers (by 9.7% vs. 6.6%) and for workers in coastal region (by 14.1% vs. 7.0%) are larger than their counterparts (rural workers-by 6.6% vs. 15.9%, and workers from middle area-by 19.3% vs. 13%, from western area-by 4.7% vs. 6.6%). Moreover, underestimation also found for cohort sub-samples, which is by 13.6% in 2010 vs. 9.1% in 2015 for pre-higher-education expansion cohort and by 6.8% vs. 11.2% for the post cohort.

One explanation for the relatively larger size of the IV estimate is the instruments are weak or nearly invalid or both (Murray 2006; Wooldridge 2002) (first-stage regression results not shown but available upon request). The F-test statistic corresponding to the estimated coefficients of early parental death and parental education are both significant and large (27 and 191 respectively) implying that the instruments are strong instrument and significant determinant of years of schooling completed. Results also show that if one's father (mother) died when the son (daughter) was 14 year-old, his (her) schooling is reduced dramatically.

We now turn to the Lewbel-IV estimates in column (3) for 2015 and column (6) for 2010. A precondition for the implementation of the Lewbel method is the existence of heteroskedasticity in the data. In all cases (either by year or by sub-samples), the Breusch-Pagan test rejects the null of constant variance. The estimates of returns to schooling using the Lewbel-IV is 11.3% in 2010 and 8.0% in 2015, which is only account for half of the value with the traditional IV method, but still larger than OLS estimates. This implies that the Lewbel estimates lie between OLS and the conventional IV estimates which is consistent with findings from previous studies (e.g. Mishra and Smyth, 2015). Moreover, consistent with other two estimates, the rate of return is higher for women and urban residents. To sum up, our CGSS estimates suggest that returns to schooling are in the range 8-16% for 2015 and 11.3-20.9% for 2010 based on the traditional IVs (parental education plus parental death) and Lewbel IV.

Table 5: OLS, Conventional IV and Lewbel IV Estimates of the Returns to Education

	2015			2010		
	OLS	IV	Lewbel-IV	OLS	IV	Lewbel-IV
Full Sample	.067***	.164***	.080***	.078***	.209***	.113***
	(14.01)	(8.42)	(5.83)	(18.16)	(10.42)	(9.41)
Constant	5.510***	4.586***	5.329***	3.773***	2.698***	3.435***
	(11.88)	(8.47)	(10.59)	(9.19)	(5.55)	(7.97)
R-squared	0.4532	0.3744	0.4335	0.5118	0.3960	0.4952
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			154.323***			186.161***
N	**3438**	**3438**	**3438**	**4223**	**4223**	**4223**
Female Sample	.069***	.147***	.109***	.090***	.237***	.127***
	(9.24)	(5.91)	(5.32)	(13.80)	(8.39)	(7.72)
Constant	4.968***	4.051***	4.497***	3.135***	2.327***	2.898***

	(6.97)	(4.90)	(5.68)	(4.91)	(3.07)	(4.32)
R-squared	0.4995	0.4417	0.4690	0.5366	0.3857	0.5066
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			48.493***			99.825***
N	**1492**	**1492**	**1492**	**1797**	**1797**	**1797**
Male Sample	.061***	.175***	.085***	.071***	.179***	.114***
	(9.44)	(5.61)	(4.31)	(12.00)	(6.47)	(6.83)
Constant	5.421***	5.114***	5.197***	4.158***	3.514***	3.795***
	(9.07)	(7.60)	(8.25)	(8.00)	(6.08)	(7.01)
R-squared	0.3892	0.2860	0.3727	0.4711	0.3959	0.4509
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			76.383***			75.394***
N	**1946**	**1946**	**1946**	**2426**	**2426**	**2426**
Urban Sample	.091***	.157***	.105***	.122***	.219***	.157***
	(17.41)	(9.06)	(7.93)	(23.51)	(11.77)	(12.21)
Constant	5.328***	5.283***	5.558***	3.898***	3.470***	3.647***
	(10.09)	(9.11)	(9.95)	(7.58)	(6.18)	(6.91)
R-squared	0.3739	0.3265	0.3698	0.4540	0.3650	0.4361
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			100.143***			86.834***
N	**1954**	**1954**	**1954**	**2288**	**2288**	**2288**
Rural Sample	.030***	.189***	.047***	.022***	.088***	.065***
	(3.45)	(3.21)	(1.75)	(3.22)	(1.52)	(1.28)
Constant	5.138***	3.477***	4.713***	3.354***	2.841***	3.367***
	(6.49)	(3.32)	(5.45)	(5.30)	(3.71)	(5.12)
R-squared	0.2800	0.1005	0.2495	0.2318	0.1833	0.2106
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			84.536***			99.915***
N	**1484**	**1484**	**1484**	**1935**	**1935**	**1935**
Eastern (coastal) provinces	.086***	.156***	.096***	.107***	.248***	.186***
	(12.43)	(7.06)	(5.63)	(15.41)	(10.55)	(10.93)
Constant	5.925***	5.478***	5.933***	4.997***	4.274***	4.502***
	(8.55)	(7.19)	(8.04)	(7.40)	(5.47)	(6.23)
R-squared	0.4112	0.3555	0.3845	0.4679	0.3113	0.4080
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			77.271***			56.989***
N	**1443**	**1443**	**1443**	**1586**	**1586**	**1586**
Middle Area	.046***	.176***	.132***	.056***	.249***	.113***
	(5.13)	(3.54)	(4.59)	(7.69)	(3.05)	(4.70)
Constant	5.265***	3.747***	4.061***	4.071***	2.578**	3.564***
	(6.44)	(3.76)	(4.47)	(6.09)	(2.49)	(4.98)
R-squared	0.3083	0.1574	0.2384	0.3802	0.0678	0.3309
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			75.702***			50.502***
N	**1128**	**1128**	**1128**	**1435**	**1435**	**1435**
Western provinces	.063***	.138***	.079***	.054***	.101***	.082***
	(6.50)	(3.27)	(1.12)	(6.77)	(2.89)	(1.45)
Constant	5.462***	5.301***	6.295***	2.596***	2.028**	2.678***
	(5.80)	(4.80)	(6.04)	(3.34)	(2.39)	(3.32)
R-squared	0.3716	0.2958	0.3273	0.4534	0.4301	0.4404
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			62.234***			99.103***
N	**867**	**867**	**867**	**1202**	**1202**	**1202**

Pre-Higher Education Expansion Cohort	.061***	.152***	.093***	.076***	.212***	.122***
	(10.99)	(6.64)	(5.60)	(16.93)	(9.65)	(9.05)
Constant	6.007***	5.303***	5.627***	4.083***	3.128***	3.683***
	(10.46)	(8.26)	(9.19)	(9.19)	(6.00)	(7.88)
R-squared	0.44	0.37	0.42	0.50	0.38	0.48
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			60.207***			63.682***
N	**2620**	**2620**	**2620**	**3766**	**3766**	**3766**
Post-Higher Education Expansion Cohort	.097***	.209***	.179***	.118***	.186***	.167***
	(8.93)	(5.16)	(5.79)	(7.11)	(3.81)	(5.37)
Constant	3.495***	3.493***	3.48***	2.063***	1.744***	1.810***
	(3.42)	(3.02)	(3.10)	(1.48)	(1.24)	(1.30)
R-squared	0.35	0.27	0.31	0.45	0.43	0.44
Breusch-Pagan Test for Heteroskedasticity in First Stage Regression Residuals			69.995***			64.544***
N	**818**	**818**	**818**	**457**	**457**	**457**

Note: (a) Data is from the Chinese General Social Survey (CGSS); (b) *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively; (c) Early parental death along with father's and mother's education are used as excluded instruments in IV model; (d) Good English skill is a dummy variable which indicates whether the English skill (including speaking and listening) of the respondent is at/above the standard proficiency level (=1) or not (=0); (e) For regional dummies, the reference group is 'middle area of China'; (f) All the regressions here controlled for personal characteristics, height and geographic location dummies. (g) Lewbel estimates also include external instruments used in the IV model; (h) Pre-higher education expansion cohort indicates individual who was older than 18-year old in 1999, while post-higher education expansion cohort indicates individual who was at or younger than 18-year old in 1999.

Lastly, some studies have additionally accounted for non-random selection into the labor market by employing Heckman's (1979) two-step procedure. Therefore, we also followed this approach to for our data. For identifying the selection correction term, lambda, we used data on non-labor income (i.e. income received from bequest) as the excluded variable for 2010 data.[8] Since this variable is unavailable in the 2015 round of CGSS, we use the total number of children as the excluded variable. However, we did not find any significant evidence of sample selection bias in CGSS data even though the identifying variables in the first stage probit models were significant and had expected signs (results not shown but available upon request).[9]

5.4 Discussion

Results from **Table 5** confirm that for CGSS data, OLS approach provides a conservative estimate of the causal effect of schooling on wages. There are several interpretations of our results. China's industrialization during the reform years heavily relied on foreign collaboration and investments. The service sector also expanded faster than the manufacturing thereby increasing the demand for foreign language skills. This has led to substantial increase in post-secondary education since 2000 and a boom in higher education enrolment. In this context, the fall in returns could be driven by an expanded supply of educated workers and diminishing returns human capital. CGSS data also confirms the rise in the supply of educated workers, particularly those with university diplomas and good English language skill (see Table 1 and Appendix Table 1). These supply-side changes may have combined to cause the decline in labor market skill premium. In particular, the fall in higher education premium by 2015 is likely to be explained by the jump in university graduates in the employed population. However, higher participation in post-secondary education and population ageing also led to a decline in LFPR. The resultant labor scarcity would have led

[8] For other studies using similar variables, see Asadullah (2006) and Xiao and Asadullah (2018).

[9] Higher unearned income from bequest is found to significantly decrease labor market participation in 2010 while the number of children is negatively correlated with participation in 2015 data.

to higher returns among educated workers.

The second possibility is that the fall is cohort specific and driven by labor market experience of young men and women who are in education instead of employment. The modest size of the fall in university wage premium also suggests that the fall is specific to new entrants into the labor market (Knight, Deng and Li, 2017). The third hypothesis is that graduates may be filtering down into less paid jobs. Emerging evidence of TFP slowdown in the China's industrial sector suggests a fourth explanation for the observed albeit modest fall in returns to schooling in CGSS data. The quantitative expansion in education may have come at the cost of quality. China performs poorly in terms of proficiency in global language of business -- its proficiency in the English has fallen ten places in the recent worldwide ranking (Tan 2015).[10] Although there are 390 million English learners in China and sizable government spending on English language training, the supply of English literate workers is still limited (Pan, 2016). Skilled labor shortage is still perceived to be a major bottleneck for productivity improvement and economic transformation in the country. Despite expansion in tertiary education, the problem of graduate unemployment is severe in non-coastal regions compared to large coastal cities (Li, Whalley and Xing 2014).

Lastly, another demand side perspective is inefficiency in the use of human capital. Negative TFP growth in recent years raises the possibility of misallocation of physical and human capital (Whalley & Zhao, 2013). Since 2010, China has activated the engine of innovation-led growth (Zilibotti, 2017). Further expansion of post-secondary enrolment must go hand in hand with improvement in education quality and high-tech export (Eichengreen et al 2012). The recent TFP slowdown is in spite of a five-fold rise in college enrollment, massification of higher education and higher spending in R&D since 2000. Only in 2015 TFP growth showed a modest increase after several years of stagnation (Song, Garnaut, Fang, and Johnston, 2017). This raises the question of labor quality and institutions governing labour use. Future studies should unpack these competing explanations for the modest decline in returns to schooling documented in this paper.

6. Conclusion

In the context of slowdown in productivity growth and the recent surge in higher education in China, this paper has provided new estimates of wage returns to education. We have done so using recent household survey data sets that is representative of all provinces and provides information on labor market performance nearly a decade after the Great Recession of 2008. Alongside OLS estimates, we used information on parental death during the respondent's childhood and parent's schooling as excluded instruments to estimate the instrumental variable (IV) model. Lastly, we report estimates for various subgroups - men vs women, rural vs urban and coastal vs. interior provinces - to document the heterogeneous nature of returns to schooling and skills in post-reform China.

Our estimates are much higher than what has been reported in the earlier studies on pre-reform China. The results also confirm that individuals in coastal and urban locations and workers with market-relevant language skill enjoy higher returns than their counterparts in rural and interior locations. Moreover, the estimated return remains much larger for higher education compared to secondary education. However, when comparison is made with estimates for 2010, the results show a modest fall in returns. Not only the average returns to

[10] Our measure of language proficiency is based on self-assessment instead of an objective evaluation of the actual skill.

schooling declined from 7.8% to 6.7% based on OLS estimates, the fall is much larger in urban locations, coastal regions and among women. Similar trends are obtained based on IV estimates.

We have considered several possible explanations for our results. While the sharp increase in university educated workers is one of the contributory factors to diminishing wage returns schooling, this supply-side channel is mostly specific to recent graduates and new entrants into the labor market. This partly explains why the observed decline in wage premium for post-secondary graduates is modest. However other possibilities include graduates filtering down into less paid jobs, inefficiency in the use of human capital as well as the adverse effects of the quantitative expansion of the educational system on educational quality. Future studies should test these competing explanations for the observed decline in returns to schooling during 2010-2015.

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Appendix Table 1: Distribution of Sample Individuals by Work Status, 2015-2010

2015	**N**	**Waged Work (Agricultural)**	**Waged Work (Non-agricultural)**	**Self-employed**	**In LF but Unemployed**	**Not in LF**
Full	10820	20.71%	27.50%	8.45%	7.53%	35.81%
Female	5763	18.90%	23.20%	6.75%	7.37%	43.78%
Male	5057	22.78%	32.41%	10.38%	7.71%	26.72%
Urban	6359	3.96%	36.72%	11.13%	7.05%	41.14%
Rural	4461	44.59%	14.37%	4.62%	8.23%	28.19%
2010	**N**	**Waged Work (Agricultural)**	**Waged Work (Non-agricultural)**	**Self-employed**	**In LF but Unemployed**	**Not in LF**
Full	11724	24.91%	28.99%	9.80%	6.67%	29.62%
Female	6079	25.07%	23.21%	7.48%	6.30%	37.93%
Male	5645	24.75%	35.22%	12.29%	7.07%	20.67%
Urban	7173	4.41%	39.04%	12.44%	7.28%	36.85%
Rural	4551	57.24%	13.16%	5.65%	5.71%	18.24%

Appendix Table A: First Stage Regression of IV Model (Dependent variable: years of schooling)

	2015	2010
Personal Characteristics		
Age	-.196***	.035
	(3.77)	(0.72)
Age square	.002***	-.001
	(2.90)	(1.50)
Female	-.752***	-.801***
	(4.96)	(5.84)
Minority	-.278	-.109
	(1.43)	(0.66)
Non-agricultural *Hukou*	1.857***	2.241***
	(12.88)	(16.34)
Currently married	.608***	.315*
	(3.72)	(1.93)
Schooling and cognitive skills		
Good English Skill	2.316***	2.454***
	(13.71)	(14.62)
Health Capital		
Height, in cm	.019*	.024***
	(1.93)	(2.64)
Self-reported Health Status:		
Bad	-.757***	-.827***
	(3.67)	(4.67)
Good	.409***	.108
	(2.99)	(0.89)
Body Mass Index (BMI):		
BMI<18.5, Underweight	-.053	-.203
	(0.25)	(1.05)
25≤BMI<30, Overweight	-.059	.130
	(0.45)	(1.06)
BMI≥30, Obese	-.237	-.379
	(0.69)	(1.12)
Family Background (Instruments)		
Parent died when respondent was 14 year-old (yes=1)	-.806***	-.857***
	(2.48)	(3.00)
$\text{Education}_{Father}$ (in years)	.172***	.138***
	(10.48)	(9.60)
$\text{Education}_{Mother}$ (in years)	.099***	.122***
	(5.54)	(7.71)
Geographic Location		
Rural	-1.507***	-1.682***
	(10.96)	(12.19)
East of China	.489***	.535***
	(3.80)	(4.43)
West of China	-.344**	-.497***
	(2.39)	(3.98)
Constant	9.800***	4.394**
	(4.76)	(2.38)
Adj R-squared	0.54	0.54
N	3438	4223
F-test of significance: parental death only	16.17***	19.03***
F-test of significance: parental education variables only	144.85***	151.61***
F-test on excluded IVs	76.53	171.19
Sargan Overid Test (p-value)	0.57	0.56
Test for endogeneity of schooling		
Wu-Hanusman F test	24.286***	47.902***
Durbin-Wu-Hausman chi sq test	24.199***	47.493***

Note: 1. Data is from the Chinese General Social Survey (CGSS); 2. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively; 3. Early parental death along with father's and mother's education are used as excluded instruments in IV model.