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Working Paper

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ISSN: 1827-3580
No. 28/WP/2017

Working Papers
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Keywords
Education, multidimensional well-being index, rural and urban China

JEL Codes
J14, I31, I24

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Education gradient in well-being late in life: the case of China

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Version: November 16th, 2017

Abstract

We draw data from the China Health and Retirement Longitudinal Study (CHARLS) to investigate the education gradient in the current well-being of a representative sample of the Chinese population aged 45 or over. We analyse how the education gradient combines with the marked differences in the social policies implemented in rural and urban China.

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1. INTRODUCTION

Over the past two decades China has been ageing rapidly. It is indisputable that an acceleration of ageing population in China is a result of an increasing life expectancy and a reducing fertility rate exacerbated after the introduction of the one-child policy in 1979. It is projected that the proportion of people aged 65 and above will increase rapidly from around 7% in 2000 to 16.5% in 2030, eventually reach a quarter in 2050 (UN, 2010). Hence, as the prevalence of older individuals in the population increases, how to promote their well-being becomes one of the greatest challenges of the Chinese policy agenda. Understanding the well-being determinants of older Chinese can support policy makers in setting initiatives that foster their social inclusion and enhance their welfare. In this paper, we will assess the well-being differentials across education groups among the older Chinese population. Our data are drawn from the China Health and Retirement Longitudinal Study (CHARLS), which is based on a representative sample of Chinese individuals aged 45 or over and their spouses.

From a theoretical perspective, education might influence people's well-being through different channels related with the human capital and health capital production[1]. As for the human capital production, the recognized importance of education in explaining personal income distribution dates back to Mincer (1958), who shows how heterogeneity in education levels can explain inequality of labour earnings over the life-cycle. Following the model proposed by Ben-Porath (1967), education can be seen as an input of the human capital production[2] and at the same time as a determinant of the marginal product of other inputs, such as innate abilities. An extensive literature has then attempted to assess the effect of education on earnings (see Card, 2001 and Heckman et al., 2006). Although this effect can vary with the business cycle phase, the industry and the socioeconomic group considered, there is an overall consensus on the hypothesis that education improves earning capability of individuals.

However, the effect of education on well-being is definitely not confined to the human capital accumulation. Grossman (1972) show that education enters the health production function in at least two ways. On one hand, higher education improves the efficiency of health production by increasing the marginal product of its inputs, such as medical care. Everything else constant, higher levels of education reduce the cost of producing a given stock of health. Individuals endowed with higher levels of education are able to produce the same level of health stock by using a lower amount of inputs due to the education-led efficiency gain. On the other hand, as long as wages increase with education, the higher is the wage offered to an individual, the higher is the value of the marginal product of health capital. Everything else constant, higher education attainments increase the

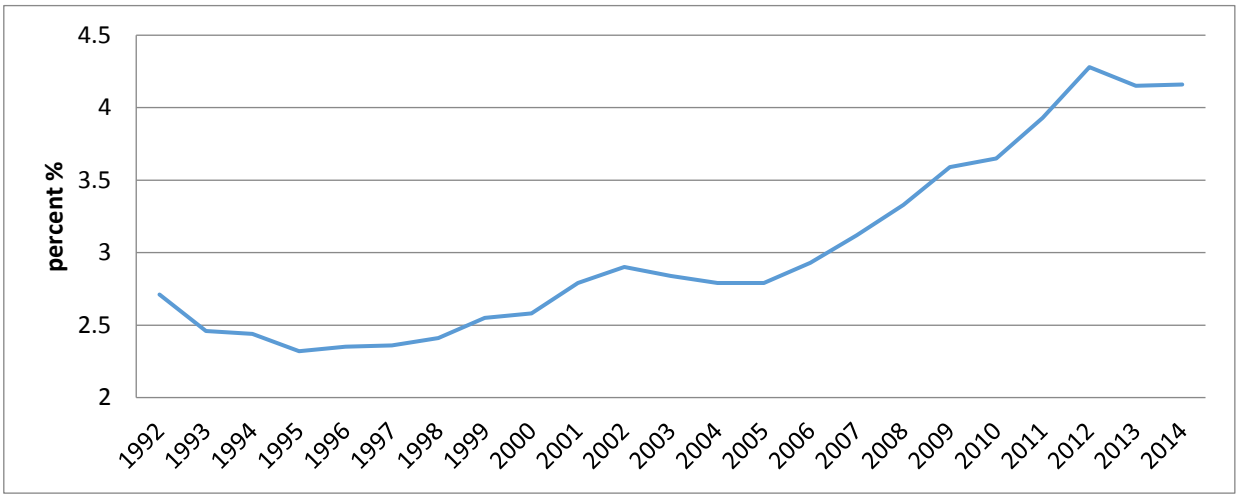
[1] Following the distinction proposed by Grossman (1972), human capital is a determinant of market and non market productivity, whereas health capital is a determinant of the total amount of time that can be spent in market and non market activities .

[2] See also Schultz (1961) and Becker (1964).

incentives to produce health capital in order to have more healthy time available for labour market activities.

China proposes as an interesting study case to analyze well-being returns to education. From a policy point of view, Heckman (2002) pointed out the relatively low investments of China government in education at the beginning of the twenty-first century, which amounted to about 2.5% of its GDP. Figure 1 shows that in the next decade the government has ramped up its investment in education and this percentage reached 4.3% in 2012 (NBS, 2014). Our study can be of use to understand the long-run well-being effects of these education investments and how they will affect the well-being late in life of the young generations who are now exposed to the benefits of these more generous education policies.

Figure 1: Government expenditures for education over GDP



(Source: NBS,2014)

Note: Government expenditures include public budgetary fund for education, taxes and fees collected by government at all levels that are used for education purpose, enterprise appropriation for enterprise-run schools, income from school-run enterprises and social services that are used for education purpose and other national appropriations for education.

Moreover, in 1958 China introduced a strict household regulation system called hukou. All Chinese citizens are classified as either urban or rural hukou[3]. Newborn babies' hukou status have to follow their mother's hukou status. Changes of the hukou type are allowed in special cases. Hukou classification is particularly important for the well-being of Chinese population since it affects social

[3] The hukou system was formally introduced at the beginning of the 1950s but only to manage administrative services, such as civil registry. Only in 1958 it took on the characteristics relevant for our work.

policies individuals are eligible to with respect to many aspects, including education, health care, income protection schemes, housing and pensions systems. Social policies designed for urban hukou holders are much more generous and financed by the State at the central level. Instead, rural hukou holders are eligible to policies that are financed at the local or at the household level, making constraints to credit access more likely to occur. An established literature has been assessing hukou differentials in well-being dimensions. Rural hukou holders have been shown to be generally poorer, less happier and more depressed than their counterparts in the urban areas (Zurlo et al., 2014; Ren and Treiman, 2015; Zhang, 2015; Sun and Liao, 2016). These differentials in well-being outcomes are related to the differences in social policies implemented in rural and urban areas of China.

As an example, the Chinese education system has been characterized by a two-track architecture. Whereas economic activities in rural areas focus on the agriculture sector, those in the urban areas mainly embrace the industry and the service sectors. Due to limited resources at the beginning of People's Republic of China (PRC), the central government originally decided to design an education system that could foster the economic growth of the industry and service sectors by investing more resources in the education of the urban scholars. In 1986 the Chinese government enacted the nine-year compulsory education law, which has been first introduced in urban areas and only later extended to the rural ones. Even nowadays the urban-rural differences in educational attainments remain substantial and they are clearly the legacy of the two-track education system architecture. If we look at the recent evidence provided by the sixth population census (The Population Census, 2010), we find that still in 2010 there was a wide gap between rural and urban areas in terms of illiteracy rate, which was 7.26% in rural areas and only 1.90% in urban areas.

In addition, there are wide differences between rural and urban hukou holders in terms of housing policies. In rural areas housing lands are allotted to households, who then bear the sole responsibility of building and maintaining their houses. This threatens the housing quality of the poorer rural households, which might be even constrained to build their accommodations on their own. Instead, in urban areas, up to the end of the 1970s, the State financed the construction of houses and rented them to households at a low price to cover maintenance costs. In the following decades a liberalization process has opened the housing market to private enterprises. Still, even nowadays, houses in urban areas are built by professional real estate development companies according to qualified standards set by the government. Moreover, in urban areas there is a financial market that supports housing investments by offering mortgage loans. These financial products are not available in rural areas.

The history of pension schemes available to urban and rural hukou holders also differ widely. The first formal pension scheme offered to urban hukou holders was introduced in 1951. It was designed for urban employees and one year later it was supplemented by a specific scheme for military and civil servants. Instead, up to the end of the 1980s, only a safety net for older individuals without other means was available for rural-hukou holders. The first pension schemes for rural hukou holders

was introduced at the beginning of the 1990s. Still, it was financed at the local level and this causes problems for disadvantaged areas in maintaining the financial sustainability of the system. Rural and urban pension schemes have been integrated in 2014.

Aggregate data can be of help to describe the starking differences in health care policies available to rural and urban hukou holders. Table 1 shows that the number of hospital beds per 1,000 people is currently more than twice in urban than in rural areas. Again, these differentials are rooted in the past. Since the introduction of the hukou system, civil servants and workers of state-owned enterprises always had a formal health care system. In the following decades the health care system provision have been reformed to cover all the urban population. Instead, rural households did not have any health care system up to the 1965. In that year it was launched a cooperative health care system financed by local authorities. This system crumbled at the beginning of the 1980s when rural households received the responsibility to finance their health care on their own. Rural households waited until 2010 for an universal health care coverage[4].

Table 1: Hospital beds per 1000 people in rural and urban China

Year	Total	rural	urban
2007	2.83	2.00	4.90
2008	3.05	2.20	5.17
2009	3.32	2.41	5.54
2010	3.58	2.60	5.94
2011	3.84	2.80	6.24
2012	4.24	3.11	6.88
2013	4.55	3.35	7.36

(Source: NBS 2014)

The presence of the hukou registration system is expected to affect the well-being differentials across education groups because it shapes the standards of living of individuals over their life course and modifies the opportunities that higher education levels might produce. Even attaining the same formal level of education, urban citizens are more likely to have benefited of better schooling infrastructures and well-prepared teachers, to have a working career spent in qualified and rewarding jobs, to live in acceptable accommodations, to be covered by generous health care systems and to receive high quality medical services. Living in a disadvantaged socioeconomic context might reduce the positive effects on well-being produced by receiving higher education since the augmented human capital does not match with institutional and market features that enable to

[4] More details related to various socio-economic policies by hukou type are available in Brugiavini et al. (forthcoming).

generate well-being returns. Neglecting the role played by the hukou system might lead to overestimate the well-being effects that rural hukou holders can benefit from achieving higher education. To what extent the hukou system impacts on education differentials in well-being is an empirical issue that our paper investigates by assessing education differences in well-being late in life separately by hukou status.

The rest of the paper proceeds as follows. Section 2 presents the data and descriptive statistics on the key variables for our analysis. Section 3 summarizes our main results. Conclusions are reported in Section 4.

2. DATA

The analysis in this paper is based on data from the China Health and Retirement Longitudinal Study (CHARLS), which is developed by a team of researchers from Peking University, the University of Southern California, and Oxford University. We use this dataset because it has several advantages over other existing Chinese micro datasets in investigating our research question. First, CHARLS is nationally representative, covering 28 provinces, while many other relevant datasets have been conducted in a more limited number of provinces. Second, it is based on a representative sample of the population of Chinese individuals aged 45 or over and their spouses. This is particularly important when addressing questions, like ours, focusing on the older Chinese population. Finally, the questionnaire administered to respondents is multipurpose and allows collecting detailed information about a variety of aspects relevant to determine their well-being, including demographics, household composition, health status and socioeconomic condition. Our main analysis is based on data drawn from the first two waves of CHARLS, which have been conducted in 2011 and 2013 respectively. Once missing values for relevant variables are dropped, our final sample reduces to 31,239 observations.

2.1 Hukou

In our analysis hukou status refers to the individuals' current hukou status, classified as rural or urban. In our sample 78% of individuals has a rural hukou, while 22% of them have an urban hukou.

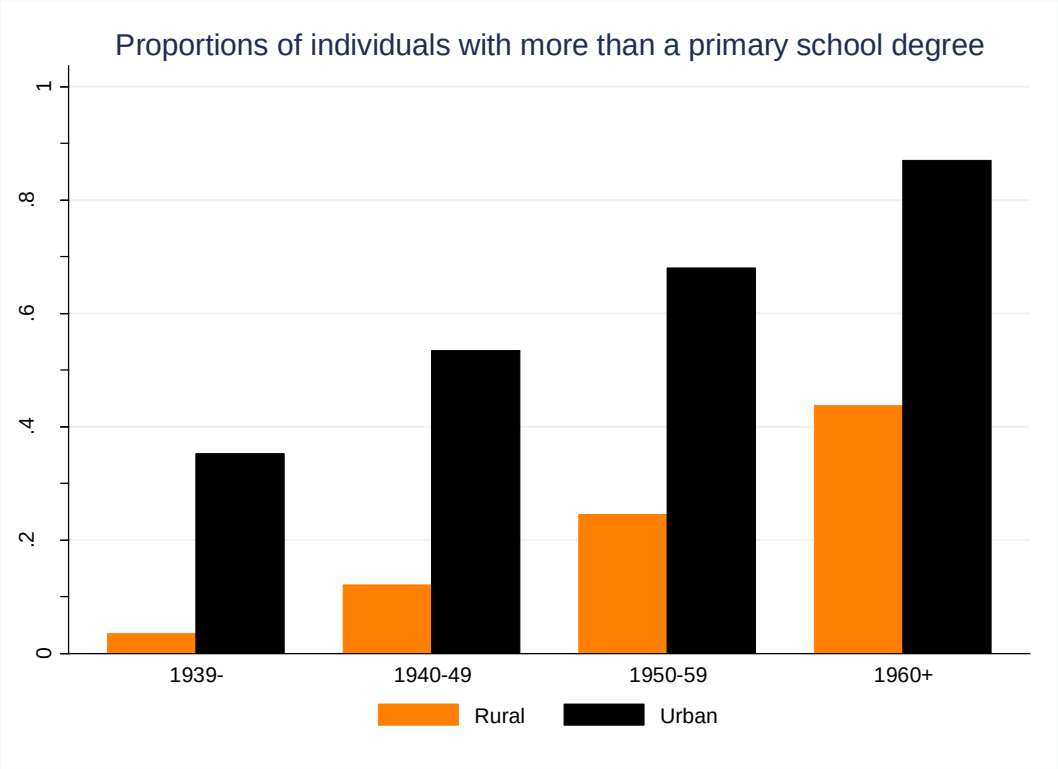
2.2 Education

We define the highest level of education attained as a dummy variable, where 1 denotes high education for those who got an educational attainment higher than the primary school degree and 0 otherwise. We selected primary school as a threshold to distinguish between low and high

education because our sample includes the older individuals, most of whom have relatively low education level. Overall, two thirds of the individuals in our sample have at most a primary school degree. In addition, the population of reference of the CHARLS survey consists of individuals aged 45 or over. They have been untouched from the nine-year compulsory education law introduced in 1986. Instead, the early target of Chinese education policy was to reach the primary school level universally. Therefore, we chose primary school as a threshold in order to get enough observations for each group and keep pace with a main policy target.

Overall, 25% of the individuals in the rural sample (i.e. those with a rural hukou) attain high education levels. This percentage jumps to 65% when looking at their counterparts in the urban sample (i.e. those with a urban hukou). Figure 2 shows that if we split the sample by cohorts, obtaining an educational attainment higher than the primary school degree is found to be more widespread for more recent cohorts in both the rural and the urban population. Although the education gradient is sizeable in all cohorts, its magnitude decreases in relative terms. When looking at individuals born in 1939 or earlier in our sample, the probability of getting more than a primary school degree for rural individuals was about one tenth than the one found for their urban counterparts (3.4% vs. 35.2%). Instead, for those born in 1960 or later, it is about one half (43.7% vs. 87%).

Figure 2: Proportion of individuals with more than a primary school degree



2.3 A multidimensional well-being index

In our study well-being is measured by a multidimensional index. In view of the multiple channels education can affect well-being and of the inherent multidimensional nature of the concept of well-being itself, we construct the index by considering two domains: material deprivation and health. This choice is in line with the recommendation by Sen (2004) to base multidimensional indexes on aspects of well-being that can be targets of public policies and of special importance for the population of interest.

The material deprivation domain is aimed at describing individuals' economic resources and their capability of affording standard needs. It is measured by a battery of 6 dimensions describing housing facilities, namely the availability of flushable toilet, electricity, running water, in-house shower and bath facilities, gas and heating system. For each dimension we define one indicator. All these indicators are defined as dummy variables taking on value 1 in presence of the housing facility considered and 0 otherwise. For each individual we calculated the proportion of indicators in which she is found not to be deprived. The higher is this proportion, the higher is the quality of the accommodation in which individuals live. The panel A of Table 2 shows that in both the rural and the urban sample individuals with higher education are on average associated with significantly higher quality accommodations. In the rural (urban) sample, individuals with low education report an average percentage of material deprivation indicators in which they are not deprived equal to 37.3% (57.9%), this percentage increases to 43.1% (70.7%) in the high education group.

Table 2: Average proportions of material deprivation and health indicators in which individuals are not deprived

	Rural		Urban	
	Low education	**High education**	**Low education**	**High education**
Panel A, Material deprivation indicators				
	0.373	0.431	0.579	0.707
Panel B, Limitations with ADL				
	0.841	0.916	0.843	0.921
Panel C, Limitations with IADL				
	0.892	0.960	0.894	0.962
Panel D, Chronic diseases				
	0.895	0.915	0.864	0.891

The health domain assesses the achievements with respect to health outcomes including activities of daily living (ADL), instrumental activities of daily living (IADL) and the presence of chronic diseases. For ADL we consider difficulties with walking 1km, getting up from a chair, climbing stairs, stooping, kneeling, crouching, reaching arms, lifting, picking up a coin, dressing, bathing, eating, getting in/out of bed, toileting, urination/defecation. For IADL we consider difficulties with doing household chores, preparing hot meals, shopping for groceries, taking medications and managing money. For each of these aspects we defined one binary indicator taking on value 1 in absence of difficulties and 0 otherwise. Overall, we defined 13 dimensions for ADL and 5 for IADL. We also consider the following 14 chronic diseases: hypertension, dyslipidemia, diabetes, cancer, chronic lung diseases, liver disease, heart attack, stroke, kidney disease, stomach disease, psychiatric disease, memory-related disease, arthritis and asthma. For each of these chronic diseases we defined one binary indicator taking on value 1 in absence of it and 0 otherwise. The panels B, C and D of Table 2 show that individuals with high education are characterized by higher average achievements, regardless of being in the urban or in the rural sample. All these differences are statistically significant. However, unlike the material deprivation case, the differences between the rural and the urban sample appear to be quite limited. For instance, as for activities with daily living, the outcomes obtained by low and the high education groups in the rural and urban sample are extremely close. For instance, both low education individuals in the rural and the urban samples are on average not deprived in 84% of the ADL dimensions. Those with high education in about 92%. However, we do not think that this evidence reduces the importance of including the health domain in our empirical exercise as it can

be explained by differences in the age composition between the rural and the urban sample. Table 3 reported selected characteristics of the age distribution. We noticed that the average age in the rural sample is lower and the same pattern is found when looking at the age distribution quartiles. These differences remain statistically significant even after controlling for birth cohort and a set of individual and household characteristics[5]. This descriptive evidence supports the hypothesis that rural individuals experience health limitations similarly to their urban counterpart but at an earlier stage of their life-cycle and suggests rural-urban differentials in mortality rate.

Table 3: Selected characteristics of the age distribution by hukou

	Average	First quartile	Second quartile	Third quartile
Rural	58.91	51	58	65
Urban	60.22	52	59	67

In order to aggregate the indicators considered for the material deprivation and health domains in a single index, a weighting scheme is needed. The choice of the weighting scheme is not univocal. Cavapozzi et al. (2015) show that the results of analyses based on multidimensional well-being indexes might be influenced by the weighting scheme adopted. To account for such heterogeneity, we decided to base our analysis on a battery of 4 alternative weighting schemes.

The first weighting scheme is a purely equal weighting scheme that assigns the same weight to each dimension, regardless of being in the material deprivation or in the health domains. However, the dimensions in the material deprivation domain are 6, whereas those in the health domain are 32. Such a weighting scheme assigns a disproportionate higher relevance to the health dimensions simply due to the extensive battery of health indicators used in our investigation. In order to assess whether our results are tenable also after a reshuffle of the overall weight assigned to the material deprivation and health domains, we propose an alternative equal weighting scheme. The second weighting scheme we use assigns the same overall weight to each domain and then the same weight to each dimension in each domain. This way, regardless of the number of the indicators considered, the material deprivation and health domains received an overall weight equal to one half. In addition, we use the frequency weighting scheme proposed by Desai and Shah (1988). Each dimension receives a weight equal to the corresponding proportion of the non-deprived in the sample. Finally, we define an alternative weighting scheme based on the principle component analysis. Each

[5] We control for cohort dummies, gender, marital status, number of children, household size and region dummies.

dimension receives a weight equal to the corresponding factor loading in the first principal component. These factor loadings are defined to aggregate indicators in a single linear index that is able to explain the highest proportion of the total variance generated by the battery of dimensions considered. Both the frequency weights and those derived according to the principal component analysis are standardized to sum up to one[6]. Table 4 summarizes the weights assigned to each dimension according to the alternative weighting scheme considered.

Table 4: Weights assigned to each dimension according to each weighting scheme

Dimension	Weight			
	1	**2**	**3**	**4**
MD: Flushable toilet	0.026	0.083	0.014	0.013
MD: Electricity	0.026	0.083	0.029	0.005
MD: Running water	0.026	0.083	0.022	0.009
MD: Bathroom	0.026	0.083	0.014	0.015
MD: Gas	0.026	0.083	0.005	0.007
MD: Heating	0.026	0.083	0.004	0.005
ADL: Walking 1km	0.026	0.016	0.027	0.045
ADL: Getting up from a chair	0.026	0.016	0.023	0.040
ADL: Climbing stairs	0.026	0.016	0.019	0.039
ADL: Stooping, kneeling, crouching	0.026	0.016	0.022	0.041
ADL: Reaching arms	0.026	0.016	0.029	0.039
ADL: Lifting	0.026	0.016	0.028	0.046
ADL: Picking up a coin	0.026	0.016	0.031	0.037
ADL: Dressing	0.026	0.016	0.031	0.048
ADL: Bathing	0.026	0.016	0.030	0.053
ADL: Eating	0.026	0.016	0.031	0.042
ADL: Getting in/out of bed	0.026	0.016	0.030	0.048
ADL: Toileting	0.026	0.016	0.028	0.049
ADL: Urination/ defecation	0.026	0.016	0.031	0.035
IADL: Household chores	0.026	0.016	0.029	0.054
IADL: Preparing hot meals	0.026	0.016	0.029	0.053
IADL: Shopping for groceries	0.026	0.016	0.029	0.049
IADL: Taking medications	0.026	0.016	0.028	0.042
IADL: Managing money	0.026	0.016	0.030	0.036

(continues)

[6] Both types of equal weights are standardized to sum up to 1 by construction.

(continued)

Dimension	Weight			
	1	2	3	4
CD: Hypertension	0.026	0.016	0.024	0.014
CD: Dyslipidemia	0.026	0.016	0.029	0.007
CD: Diabetes	0.026	0.016	0.030	0.008
CD: Cancer	0.026	0.016	0.032	0.003
CD: Chronic lung diseases	0.026	0.016	0.029	0.012
CD: Liver disease	0.026	0.016	0.031	0.004
CD: Heart attack	0.026	0.016	0.028	0.013
CD: Stroke	0.026	0.016	0.031	0.019
CD: Kidney disease	0.026	0.016	0.030	0.008
CD: Stomach disease	0.026	0.016	0.025	0.009
CD: Psychiatric disease	0.026	0.016	0.032	0.008
CD: Memory-related disease	0.026	0.016	0.032	0.018
CD: Arthritis	0.026	0.016	0.021	0.017
CD: Asthma	0.026	0.016	0.031	0.010

Note: MD stands for Material Deprivation, ADL for Activities of daily living, IADL for Instrumental Activities of Daily Living, CD for Chronic Diseases. For dimensions of MD the indicators take on value 1 if the facility is available at home and 0 otherwise. For dimensions of ADL, IADL and CD the indicators take on value 1 if the individual does not suffer of the problem and 0 otherwise.

The well-being index is computed at the individual level by taking the weighted summation of the individual achievements with respect to the battery of indicators defined for the material deprivation and health domains. The well-being index lies between 0 and 1 by construction due to weight standardization and the binary nature of the indicators used.

Table 5 summarizes selected characteristics of the distribution of the four well-being indexes considered. In both the rural and the urban sample, on average, individuals with high education rank higher than their low education counterparts. Depending on the well-being index considered, the education differential in well-being ranges from 5% to 9% for the rural sample and from 6% to 13% for the urban sample. All these differentials are statistically different from 0. Their variability across indexes witnesses the importance of not basing the analysis on only one weighting scheme. Overall, analogous conclusions are drawn when looking at quartiles. Individuals with higher education are characterized by significantly higher levels of the first, second and third quartile of the well-being distribution in both the urban and the rural sample. The next section will be devoted to assess whether these differentials remain significant after controlling for individual and household characteristics.

Table 5: Distribution of the multidimensional well-being indexes

	Well-being index			
	1	**2**	**3**	**4**
Rural				
Low education				
Average	0.794	0.623	0.857	0.835
First quartile	0.737	0.536	0.812	0.783
Second quartile	0.816	0.620	0.891	0.893
Third quartile	0.868	0.719	0.941	0.948
High education				
Average	0.845	0.677	0.904	0.900
First quartile	0.816	0.583	0.878	0.881
Second quartile	0.868	0.667	0.924	0.939
Third quartile	0.895	0.771	0.963	0.965
Urban				
Low education				
Average	0.816	0.720	0.862	0.843
First quartile	0.763	0.620	0.818	0.797
Second quartile	0.842	0.734	0.897	0.903
Third quartile	0.895	0.833	0.948	0.958
High education				
Average	0.882	0.811	0.915	0.916
First quartile	0.842	0.734	0.886	0.899
Second quartile	0.895	0.833	0.942	0.954
Third quartile	0.947	0.917	0.973	0.983

3. RESULTS

3.1 Baseline specifications

We estimate linear regression models by OLS in which the dependent variable is the logarithm of the multidimensional well-being index and the main explanatory variable is the education dummy discriminating those with at most and those with more than a primary school degree. The set of right-hand-side variables also includes cohort dummies, a second order polynomial of age, gender, marital status, number of children, household size, region dummies and a constant term. Table 6 shows the summary statistics of the explanatory variables used in the regressions. We estimate our models separately by hukou groups. This way the relationship between well-being index and a given

explanatory variable is allowed to vary between urban and rural individuals[7].

The panel A of Table 7 reports the point estimates and their standard errors for the coefficient on the education dummy. Regardless of the well-being index considered, individuals with higher education are always expected to have higher levels of well-being late in life, both in the rural and in the urban sample. If we look at the first well-being index, high education is associated with an increase by 2.3% (=(exp(0.023)-1)*100) in the rural sample. Instead, this variation more than doubles for the urban sample and it becomes equal to 5.23%. The difference between these two variations is statistically significant[8]. Overall, our results suggest that high education investments are always associated with a significant increase in the well-being late in life. However, the well-being returns to education are higher if the individual could benefit of more inclusive social policies. Although the size of the variation changes, these results are found for all the well-being indexes considered.

We repeat our empirical exercise by using quantile regressions. Our aim is to investigate whether the relationship between education and well-being late in life changes along with the well-being distribution. Individuals who rank differently in the well-being distribution might have different characteristics with respect to parental background, innate abilities, family ties and social networks that might alter the association between education and well-being. As an example, a richer and more educated parental background might make less prominent the role of education in preserving well-being late in life. Instead, for individuals coming from more disadvantaged households, education might act as the main tool to support their well-being over the life-course. We ran first quartile, median and third quartile regressions by using the same set of explanatory variables considered before. The results are summarized in the panels B, C and D of Table 7 respectively. Our previous findings are overall confirmed. Receiving high education is associated with significant improvements of well-being late in life for both urban and rural hukou holders. If we consider the equal weighting index (i.e. the first index), the well-being distribution of the high education individuals in the urban sample is shifted to the right as the first quantile, the median and the third quartile are respectively 5.7%, 4.5% and 2.9% higher than their low education counterparts. An analogous pattern, albeit less marked, is found in the rural sample. Consistently with the OLS results, the gain that urban hukou holders get from education are significantly higher.

[7] Our sample may include cohabiting partners. We account for the presence of within-household correlation in the error term of our estimating equations by clustering standard errors at the household level.

[8] We tested the significance of the difference between these two parameters by running a Chow test. We pooled the rural and the urban sample together and regressed the well-being index on a dummy for the hukou status, all the other explanatory variables considered in our analysis (including education) as well as a full set of interactions between the hukou dummy and explanatory variables. We tested the significance of the parameter on the interaction between the hukou and the education dummy.

Table 6: Summary statistics of the variables used in the regression analysis

Variable	Description	Rural		Urban	
		Size	Average	Size	Average
Covariates included in the all the specifications					
educ	dummy=1 if the R has more than a primary school degree	24,233	0.253	7,006	0.649
coh49	dummy=1 if the R was born between 1940 and 1949	24,233	0.224	7,006	0.248
coh59	dummy=1 if the R was born between 1950 and 1959	24,233	0.371	7,006	0.347
coh60	dummy=1 if the R was born in 1960 or later	24,233	0.301	7,006	0.266
age	age of the R	24,233	58.909	7,006	60.218
age2	squared of the age of R	24,233	3568.188	7,006	3728.949
female	dummy=1 if the R is a woman	24,233	0.531	7,006	0.481
married	dummy=1 if the R has a cohabiting partner	24,233	0.877	7,006	0.884
children	number of children	24,233	2.716	7,006	2.10
hhsize	household size	24,233	4.276	7,006	3.781
west	dummy=1 if the R lives in the West of China	24,233	0.338	7,006	0.284
east	dummy=1 if the R lives in the East of hina	24,233	0.321	7,006	0.276
central	dummy=1 if the R lives in the Centre of China	24,233	0.290	7,006	0.278
Early life conditions indicators					
alive_mother	dummy=1 if the mother of R was alive when she/he was 5	15,144	0.973	4,047	0.984
alive_father	dummy=1 if the father of R was alive when she/he was 5	15,144	0.954	4,047	0.964
educ_mother	dummy=1 if the mother of R has more than a primary school degree	15,144	0.098	4,047	0.232
educ_father	dummy=1 if the father of R has a more than a primary school degree	15,144	0.358	4,047	0.552
not_hunger	dummy=1 if the R does not experience hunger between 0 and 5 years of age	15,144	0.619	4,047	0.710
water	dummy=1 if the R had clean water in the accommodation between 0 and 5 years of age	15,144	0.010	4,047	0.138
energy	dummy=1 if the R had electricity in the accommodation between 0 and 5 years of age	15,144	0.057	4,047	0.290

Table 7: Education differentials in well-being late in life, by hukou status. High education vs. low education group comparison. Baseline group: individuals with at most a primary school degree

	Well-being index			
	1	**2**	**3**	**4**
Panel a) - OLS regressions				
Urban	0.051***	0.104***	0.033***	0.051***
	(0.005)	(0.007)	(0.005)	(0.007)
Rural	0.023***	0.044***	0.017***	0.023***
	(0.003)	(0.004)	(0.002)	(0.004)
Difference	0.028***	0.061***	0.016***	0.028***
U-R	(0.006)	(0.008)	(0.005)	(0.008)
Panel b) - First quartile regressions				
Urban	0.055***	0.132***	0.038***	0.055***
	(0.007)	(0.016)	(0.005)	(0.008)
Rural	0.024***	0.032***	0.019***	0.029***
	(0.004)	(0.006)	(0.003)	(0.004)
Difference	0.031***	0.099***	0.018***	0.026***
U-R	(0.008)	(0.018)	(0.007)	(0.010)
Panel c) - Median regressions				
Urban	0.044***	0.102***	0.026***	0.029***
	(0.005)	(0.013)	(0.004)	(0.004)
Rural	0.016***	0.046***	0.012***	0.014***
	(0.002)	(0.006)	(0.002)	(0.002)
Difference	0.028***	0.056***	0.014***	0.015***
U-R	(0.007)	(0.014)	(0.004)	(0.004)
Panel d) - Third quartile regressions				
Urban	0.029***	0.072***	0.014***	0.016***
	(0.004)	(0.007)	(0.003)	(0.002)
Rural	0.015***	0.036***	0.010***	0.007***
	(0.002)	(0.005)	(0.001)	(0.001)
Difference	0.014***	0.036***	0.005	0.009***
U-R	(0.004)	(0.009)	(0.003)	(0.003)
Panel e) – Differences between the third and the first quartile				
Urban	-0.026***	-0.060***	-0.023***	-0.039***
	(0.006)	(0.011)	(0.004)	(0.007)
Rural	-0.009***	0.003	-0.010***	-0.022***
	(0.003)	(0.005)	(0.002)	(0.003)

Note: Specifications control for cohort dummies, a second order polynomial of age, gender, presence of a cohabiting partner, number of children, household size and region dummies. Standard errors are clustered to account for intrahousehold correlation in the error term. *** p<0.01, ** p<0.05, * p<0.1.

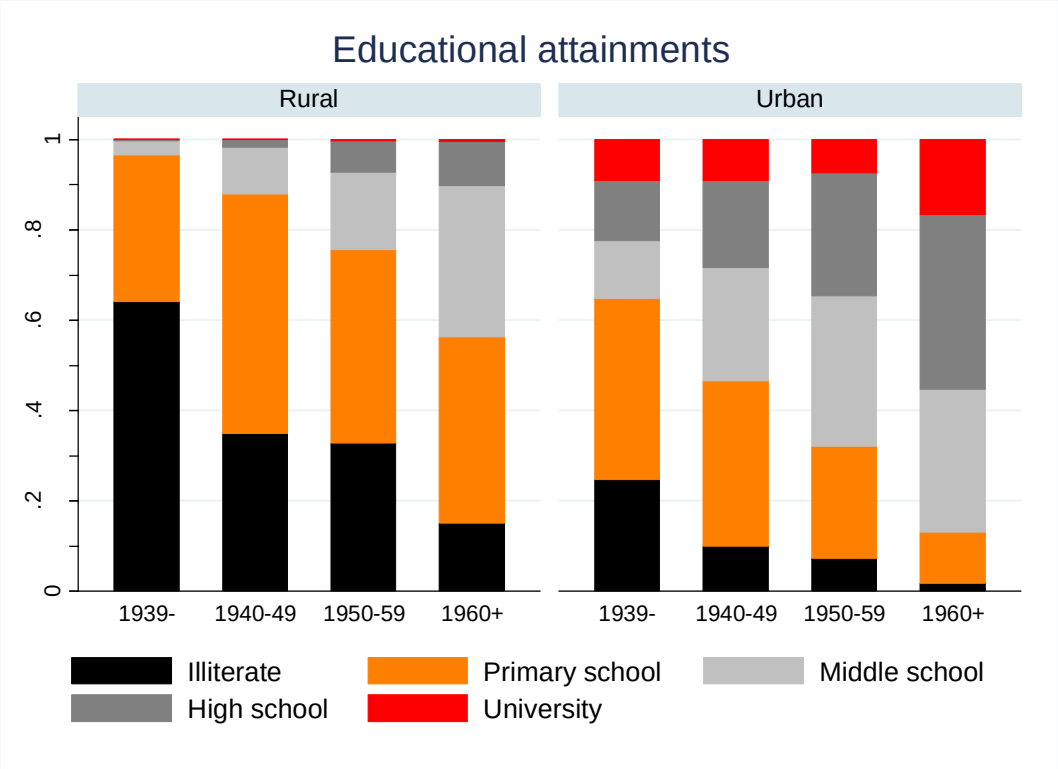
The utilization of the quantile regressions allows to assess whether and how the role of education might change along the well-being distribution as a consequence of the heterogeneity in unobserved individual characteristics that are relevant determinants of the socioeconomic and health status, such as genetics, skills, motivations and social networks. Our results clearly point out the education gradient in well-being decreases as we consider higher quantiles of the distribution.

The panel E) of Table 7 reports the difference in the education gradient between the third and the first quartile of the well-being distribution (i.e. the difference between the coefficients on the education dummy in the corresponding quantile regression specifications). With the exception of one case, in both the rural and the urban sample this difference is always negative and statistically significant. The general message conveyed by these statistics is that the education gradient at the first quartile is significantly higher than the one at the third quartile. Within both the rural and the urban sample individuals who rank worse in the well-being distribution are those who are expected to benefit more from higher educational attainments.

3.2 Differentiating educational attainments

Figure 3 shows the distribution of the educational attainments in our sample. There are sharp differences in the education level distribution between urban and rural hukou holders. As noted earlier, the percentage of individuals with at most a primary school degree more than doubles in the rural sample. On the contrary, the percentage of rural hukou holders with a middle school degree is slightly higher than one half than that of their urban counterparts and the percentage of those with at least a high school degree is about one sixth. Building upon this evidence, it might be argued that the wider increase in well-being levels of highly educated individuals found for urban hukou holders is not related to their hukou type, but it is generated by the fact that urban individuals placed in the high education category according to our binary classification of education levels are likely to be more educated than those in the rural sample classified in the same category.

Figure 3: Distribution of educational attainments



To assess whether this is actually the case, we define a more refined set of education dummies distinguishing four mutually exclusive educational attainments: illiterate (i.e. no education), at most primary school degree, at most middle school degree and at least a high school degree. This alternative classification dramatically reduces the heterogeneity of education levels across hukou holders placed in the same category and allows a tighter comparison of the well-being differentials between urban and rural areas. In our regression we keep literate individuals with at most primary school degree as baseline group. The panel A) of Table 8 reports the results obtained by running OLS regressions. In both the rural and the urban sample, having a middle school degree or a high school degree is associated with higher levels of well-being. Still, such increases in well-being are found to be significantly higher for urban hukou holders. As an example, if we keep focusing on the first weighting scheme, having a middle school degree in the urban sample is associated with an increase by 3.8% in well-being, in the rural sample this percentage shrinks to 1.5%. The difference between these two variations is statistically significant. Instead, being illiterate is associated with a reduction in well-being levels with respect to the baseline group that does not significantly vary across hukou types. This pattern is invariant across weighting schemes.

Table 8: Education differentials in well-being late in life, by hukou status. Alternative classification of educational attainments. Four education levels considered: illiterate, primary school degree, middle school degree, high school degree or higher. Baseline group: literate individuals with at most a primary school degree

	Well-being index			
	1	**2**	**3**	**4**
Panel a) – OLS regressions				
Illiterate				
Urban	-0.012	-0.036***	-0.006	-0.019
	(0.010)	(0.013)	(0.009)	(0.015)
Rural	-0.026***	-0.048***	-0.021***	-0.039***
	(0.003)	(0.004)	(0.003)	(0.005)
Difference	0.013	0.012	0.015	0.020
U-R	(0.010)	(0.014)	(0.010)	(0.016)
Middle school				
Urban	0.037***	0.079***	0.024***	0.034***
	(0.006)	(0.009)	(0.006)	(0.009)
Rural	0.015***	0.029***	0.011***	0.011**
	(0.003)	(0.004)	(0.003)	(0.004)
Difference	0.023***	0.049***	0.013**	0.023**
U-R	(0.007)	(0.010)	(0.006)	(0.010)
High school or university				
Urban	0.057***	0.113***	0.039***	0.059***
	(0.006)	(0.008)	(0.005)	(0.008)
Rural	0.020***	0.035***	0.014***	0.018***
	(0.004)	(0.007)	(0.004)	(0.006)
Difference	0.038***	0.078***	0.024***	0.041***
U-R	(0.007)	(0.011)	(0.007)	(0.010)

(continues)

(continued)

	Well-being index			
	1	**2**	**3**	**4**
Panel b) – First quartile regressions				
Illiterate				
Urban	-0.012	-0.054*	-0.008	-0.034
	(0.018)	(0.029)	(0.013)	(0.029)
Rural	-0.030***	-0.050***	-0.026***	-0.042***
	(0.005)	(0.006)	(0.004)	(0.006)
Difference	0.018	-0.003	0.018	0.008
U-R	(0.018)	(0.032)	(0.014)	(0.027)
Middle school				
Urban	0.044***	0.106***	0.029***	0.041***
	(0.008)	(0.015)	(0.006)	(0.010)
Rural	0.014***	0.018***	0.013***	0.016***
	(0.004)	(0.006)	(0.003)	(0.004)
Difference	0.029***	0.088***	0.016**	0.025**
U-R	(0.009)	(0.015)	(0.007)	(0.010)
High school or university				
Urban	0.059***	0.140***	0.039***	0.056***
	(0.007)	(0.015)	(0.006)	(0.009)
Rural	0.022***	0.018*	0.018***	0.030***
	(0.005)	(0.010)	(0.005)	(0.005)
Difference	0.037***	0.122***	0.021***	0.025**
U-R	(0.010)	(0.019)	(0.007)	(0.011)
Panel c) – Median regressions				
Illiterate				
Urban	-0.017*	-0.039**	-0.012	-0.017*
	(0.009)	(0.017)	(0.007)	(0.009)
Rural	-0.020***	-0.049***	-0.016***	-0.024***
	(0.003)	(0.005)	(0.002)	(0.003)
Difference	0.003	0.010	0.004	0.007
U-R	(0.009)	(0.018)	(0.008)	(0.009)
Middle school				
Urban	0.033***	0.075***	0.021***	0.024***
	(0.006)	(0.011)	(0.004)	(0.004)
Rural	0.009***	0.030***	0.007***	0.008***
	(0.002)	(0.006)	(0.002)	(0.002)
Difference	0.024***	0.044***	0.014***	0.016***
U-R	(0.006)	(0.013)	(0.004)	(0.005)

(continues)

(continued)

	Well-being index			
	1	**2**	**3**	**4**
High school or university				
Urban	0.045***	0.115***	0.026***	0.030***
	(0.006)	(0.013)	(0.004)	(0.004)
Rural	0.013***	0.038***	0.009***	0.011***
	(0.004)	(0.010)	(0.003)	(0.002)
Difference	0.032***	0.077***	0.017***	0.019***
U-R	(0.007)	(0.016)	(0.005)	(0.005)
Panel d) – Third quartile regressions				
Illiterate				
Urban	-0.012*	-0.019*	-0.003	-0.008*
	(0.007)	(0.011)	(0.005)	(0.004)
Rural	-0.013***	-0.047***	-0.008***	-0.009***
	(0.002)	(0.006)	(0.001)	(0.001)
Difference	0.001	0.028**	0.005	0.001
U-R	(0.007)	(0.013)	(0.006)	(0.004)
Middle school				
Urban	0.022***	0.051***	0.011***	0.012***
	(0.004)	(0.007)	(0.003)	(0.002)
Rural	0.010***	0.024***	0.007***	0.004***
	(0.002)	(0.005)	(0.001)	(0.001)
Difference	0.012**	0.028***	0.004	0.007***
U-R	(0.005)	(0.009)	(0.003)	(0.003)
High school or university				
Urban	0.032***	0.083***	0.015***	0.015***
	(0.004)	(0.008)	(0.003)	(0.002)
Rural	0.014***	0.034***	0.010***	0.007***
	(0.003)	(0.007)	(0.002)	(0.001)
Difference	0.018***	0.049***	0.006	0.009***
U-R	(0.005)	(0.010)	(0.004)	(0.003)

Note: Specifications control for cohort dummies, a second order polynomial of age, gender, presence of a cohabiting partner, number of children, household size and region dummies. Standard errors are clustered to account for intrahousehold correlation in the error term. *** p<0.01, ** p<0.05, * p<0.1.

The panels B) – D) of Table 8 document that analogous results are obtained when using quantile regressions to model the first, second and third quartile of the well-being distribution. Overall, the results produced by a tighter classification of the educational attainments are consistent with those produced by our original and more parsimonious binary classification. In both the rural and the

urban sample individuals with higher education enjoy higher levels of well-being late in life. Moreover, the well-being gains from receiving higher education are larger for urban hukou holders, in particular at the first quartile and at the median of the well-being distribution.

3.3 Early-life conditions

A wide empirical literature is assessing the effect of early-life conditions on socioeconomic outcomes late in life (see for instance, Cunha and Heckman, 2007 and Cunha et al., 2010). The quantity and the quality of goods and time provided by parents can enter the human and health production functions of children affecting their outcomes over the whole life course. As an example, highly educated parents could lead to higher educational achievements of children because of either superior genetic abilities passed to the offspring or more efficient use of the time spent with children in stimulating their abilities (Leibowitz, 1977). Moreover, the higher is the wealth of parents, the higher is the probability for children of not facing credit constraints in financing education and health care needs. Brunello et al. (2017) use SHARE (Survey of Health, Ageing and Retirement in Europe) to assess the effect of education on lifetime earnings in a sample of older male individuals living in nine European countries. They show that returns to education widely vary with childhood conditions and in particular they are lower for individuals who had few books at home during childhood. The availability of more books at home can be an indicator of a more educated and richer parental background and these conditions can positively affect skill formation and increase the positive effect of education on earnings over the life time. Mazzonna (2014) draws data from SHARE to investigate the role of childhood socioeconomic status on health, cognition and household income late in life. His results are consistent with the hypothesis that better early life conditions improve the well-being of the elderly along these domains.

In view of this evidence, early life conditions can act as confounders in our framework and produce a spurious relationship between education and well-being. Growing up in richer and better educated households might affect education attainments by reducing the occurrence of credit constraints to finance education or by inducing a positive effect on the ability formation process. However, we cannot claim that the effect of early life conditions on well-being occurs via education only. Brunello et al. (2017) show that a better parental background can boost the returns to education and then affect the life-time income profile of an individual. The same educational attainment can produce a different effect on life time earnings depending on individuals early life conditions. Mazzonna (2014) shows that early life conditions affect positively cognitive abilities late in life, which are important determinants of financial well-being by making individuals more able to use properly more sophisticated financial products (Jappelli and Padula, 2013), manage their economic resources more wisely over the life cycle (Van Rooij et al., 2011) and avoid financial mistakes (Lusardi and Tufano,

2009). Finally, in line with Mazzonna (2014), a richer and more educated family background can facilitate health care investments (e.g. vaccinations, regular medical visits) and promoting healthier life styles that are expected to produce long lasting effects on health. This is consistent with Grossman (1972), who formally shows that higher investments in the production of health in a given period increase the stock of health in all future periods.

It should be noted that splitting the sample by type of hukou is already in line with the necessity of controlling for heterogeneity in early life conditions given the sharp differences in social policies between urban and rural hukou holders documented in the Introduction. However, we take advantage of CHARLS data to introduce a further set of controls in our specifications to balance early-life conditions heterogeneity across respondents within hukou-groups. Given the focus of our work, we focused on socioeconomic characteristics referring to the period between 0 and 5 years of age in order to consider factors that cannot be classified themselves as consequences of the education process and that can be considered as pre-determined with respect to it. More specifically, we included in our specifications one dummy for each parent indicating whether she/he was alive when the respondent was 5 years old and one further dummy for each parent to indicate whether she/he has an educational attainment higher than the primary school degree. We also defined one dummy to identify individuals who did not experience hunger up to age of 5. Finally, we defined two dummies to identify individuals who up to the age of 5 live in a house with clean water and energy, respectively. As reported in Table 6, the distribution of some of these indicators markedly differ across hukou types. For instance, the probability of having spent the first five years of life in an accommodation with clean water is 1% in the rural sample and 14% in the urban sample. Only 10% of rural respondents have a mother with a primary school degree or higher. This percentage jumps to 23% in the urban sample. Respondents in the rural sample are about 10 percentage points more likely to have experienced hunger in their first five years of life. The sample size reduces as some of these variables are taken from the third wave of CHARLS (CHARLSLife), which is a retrospective survey on the life of CHARLS respondents aimed at reconstructing the main events occurring in their lives. Table 9 documents that our results. Even after controlling for our early life condition indicators, individuals with higher education enjoy higher well-being late in life. Well-being differentials across education groups are always significant but they tend to be higher in the case of urban hukou holders. Finally, it is worth noticing that the conclusions that can be drawn from the comparison of the education differentials at the third and the first quartile are totally in line with the baseline case. The educational gradient in well-being is significantly higher for individuals who rank worse in the well-being distribution. The gains from educational investments are wider for more disadvantaged urban and rural Chinese. Our results appear not to be driven by spurious correlation induced by inequalities in early life conditions.

3.4 Changes in the hukou status

CHARLS data allows recovering hukou changes occurred over the life course. In particular, in addition to the current hukou, the CHARLS questionnaire asks the first hukou in life. The data show that changing the hukou-type is not widespread. Only 11% of those who have a first rural hukou are classified as urban hukou holders at the time of the interview. As expected, almost all those who have a first urban hukou have maintained it up to the time of the interview. In 2013 only 2% of the sample (38 individuals) are found to have switched their first urban hukou to the rural type. However, it might be argued that, everything else constant, the well-being returns to education might be more penalized for individuals who have always been entitled to a rural hukou than for those who became urban hukou holders at some point of their life or from those who have always been urban hukou holders. To ascertain whether this is actually the case, we split the sample in three groups: those who maintain their rural hukou over time, those who switch their rural hukou to the urban type and those who maintain their urban hukou over time. Given the very small sample size of the group of individuals who switch their hukou from urban to rural, we discard it. We then estimated our OLS and quantile regressions in the remaining three subsamples. Results are reported in Table 10. All our results indicate that higher education is always associated with higher well-being. Even in the group of individuals who have held a rural hukou during their whole life, the education differential in well-being is sizeable and statistically significant. Moreover, the gains from education in this group appear to be overall significantly lower than those found in other groups. If we look at the first weighting scheme, we notice that for individuals who have always had a urban hukou, the well-being index of those with high education is on average 5.13% higher. This education gradient in well-being remains stable when considering those who switch from rural to urban hukou but it reduces to 2.33% for those who have always been rural hukou holders. The inspection of the Panel E) of Table 10 shows results that fully align with our previous findings. Regardless of the group considered, the educational gradient at the third quartile of the well-being distribution is significantly lower than at the first quartile.

Table 9: Education differentials in well-being late in life, by hukou status. Controlling for early life conditions. High education vs. low education group comparison. Baseline group: individuals with at most a primary school degree

	Well-being index			
	1	**2**	**3**	**4**
Panel a) - OLS regressions				
Urban	0.048***	0.081***	0.034***	0.058***
	(0.007)	(0.010)	(0.006)	(0.009)
Rural	0.022***	0.037***	0.017***	0.022***
	(0.003)	(0.005)	(0.003)	(0.005)
Difference	0.026***	0.045***	0.017***	0.036***
U-R	(0.007)	(0.011)	(0.007)	(0.011)
Panel b) - First quartile regressions				
Urban	0.050***	0.109***	0.034***	0.062***
	(0.009)	(0.017)	(0.007)	(0.011)
Rural	0.027***	0.033***	0.022***	0.034***
	(0.004)	(0.007)	(0.004)	(0.005)
Difference	0.023***	0.076***	0.011	0.028**
U-R	(0.009)	(0.020)	(0.008)	(0.012)
Panel c) - Median regressions				
Urban	0.039***	0.078***	0.025***	0.032***
	(0.006)	(0.013)	(0.005)	(0.005)
Rural	0.016***	0.037***	0.012***	0.014***
	(0.002)	(0.007)	(0.002)	(0.002)
Difference	0.023***	0.042***	0.012***	0.018***
U-R	(0.008)	(0.014)	(0.005)	(0.005)
Panel d) - Third quartile regressions				
Urban	0.026***	0.057***	0.013***	0.016***
	(0.005)	(0.010)	(0.003)	(0.003)
Rural	0.014***	0.031***	0.009***	0.007***
	(0.002)	(0.006)	(0.002)	(0.001)
Difference	0.012**	0.027**	0.004	0.009***
U-R	(0.005)	(0.012)	(0.004)	(0.003)
Panel e) – Differences between the third and the first quartile				
Urban	-0.024***	-0.052***	-0.021***	-0.046***
	(0.006)	(0.013)	(0.006)	(0.008)
Rural	-0.013***	-0.002	-0.014***	-0.026***
	(0.003)	(0.006)	(0.003)	(0.004)

Note: Specifications control for cohort dummies, a second order polynomial of age, gender, presence of a cohabiting partner, number of children, household size, region dummies, parental living status at the age of 5, parental education,having not experienced hunger before age 5, living in accommodation with clean water and energy before age 5. Standard errors are clustered to account for intrahousehold correlation in the error term. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Education differentials in well-being, by hukou status. Splitting the sample by groups defined according to first and current hukou type. High education vs. low education group comparison. Baseline group: individuals with at most a primary school degree

	Well-being index			
	1	**2**	**3**	**4**
Panel a) - OLS regressions				
Urban-Urban	0.050***	0.116***	0.031***	0.052***
	(0.007)	(0.010)	(0.006)	(0.010)
Rural-Urban	0.053***	0.093***	0.038***	0.053***
	(0.008)	(0.010)	(0.007)	(0.012)
Rural-Rural	0.023***	0.044***	0.017***	0.023***
	(0.003)	(0.004)	(0.002)	(0.004)
Difference	0.027***	0.073***	0.013**	0.029***
U-U vs R-R	(0.007)	(0.011)	(0.007)	(0.011)
Difference	0.030***	0.049***	0.020***	0.030**
R-U vs R-R	(0.008)	(0.011)	(0.008)	(0.012)
Panel b) - First quartile regressions				
Urban-Urban	0.056***	0.145***	0.033***	0.057***
	(0.008)	(0.017)	(0.007)	(0.012)
Rural-Urban	0.058***	0.126***	0.040***	0.049***
	(0.012)	(0.023)	(0.009)	(0.013)
Rural-Rural	0.024***	0.032***	0.019***	0.029***
	(0.004)	(0.006)	(0.003)	(0.004)
Difference	0.033***	0.113***	0.013*	0.027**
U-U vs R-R	(0.010)	(0.020)	(0.008)	(0.012)
Difference	0.034**	0.094***	0.021**	0.020
R-U vs R-R	(0.015)	(0.023)	(0.010)	(0.013)

(continues)

(continued)

	Well-being index			
	1	**2**	**3**	**4**
Panel c) - Median regressions				
Urban-Urban	0.044***	0.110***	0.024***	0.029***
	(0.007)	(0.013)	(0.005)	(0.006)
Rural-Urban	0.047***	0.091***	0.030***	0.031***
	(0.008)	(0.016)	(0.006)	(0.006)
Rural-Rural	0.016***	0.046***	0.012***	0.014***
	(0.002)	(0.006)	(0.002)	(0.002)
Difference	0.028***	0.064***	0.012**	0.015**
U-U vs R-R	(0.007)	(0.014)	(0.006)	(0.006)
Difference	0.032***	0.045**	0.018***	0.017***
R-U vs R-R	(0.008)	(0.018)	(0.006)	(0.006)
Panel d) - Third quartile regressions				
Urban-Urban	0.029***	0.077***	0.012***	0.014***
	(0.005)	(0.009)	(0.004)	(0.003)
Rural-Urban	0.032***	0.068***	0.019***	0.018***
	(0.005)	(0.009)	(0.004)	(0.003)
Rural-Rural	0.015***	0.036***	0.010***	0.007***
	(0.002)	(0.005)	(0.001)	(0.001)
Difference	0.014**	0.041***	0.003	0.008**
U-U vs R-R	(0.006)	(0.010)	(0.004)	(0.003)
Difference	0.017***	0.032***	0.009**	0.011***
R-U vs R-R	(0.005)	(0.010)	(0.004)	(0.003)
Panel e) – Differences between the third and the first quartile				
Urban-Urban	-0.028***	-0.068***	-0.021***	-0.042***
	(0.007)	(0.013)	(0.006)	(0.009)
Rural-Urban	-0.025***	-0.058***	-0.022***	-0.032***
	(0.009)	(0.016)	(0.007)	(0.011)
Rural-Rural	-0.009***	0.004	-0.010***	-0.023***
	(0.003)	(0.005)	(0.002)	(0.003)

Note: Specifications control for cohort dummies, a second order polynomial of age, gender, presence of a cohabiting partner, number of children, household size and region dummies. Standard errors are clustered to account for intrahousehold correlation in the error term. *** p<0.01, ** p<0.05, * p<0.1.

4. CONCLUSIONS

China proposes as an interesting study case to analyze the education differentials in well-being late in life. Since the Chinese government has been increasing investments in education in the last two decades, it is policy relevant to understand the consequences on well-being of improving education access as well as whether they remain sizeable even late in life. Chinese population is ageing and the proportion of individuals aged 65 or over is expected to attain 25% in 2050. Fostering their well-being is becoming a key-point in the policy agenda. In addition to this, China is a worth considering context in which assessing education differentials due to the duality of its social policies. At the end of the 1950s the Chinese government introduced a strict regulation system called hukou that splits Chinese in rural and urban citizens and allows limited possibility to change the original assignment. The hukou system reserves to urban hukou holders much more inclusive and generous social interventions in many respects, such as education, housing, pension system and health care. Only very recently the government has started to overcome this duality in social policies.

Education can affect well-being according to multiple channels. For instance, higher educational attainments can improve human capital and health capital formation. Nevertheless, the socioeconomic context in which individuals live might amplify or reduce the gains from education. Living in disadvantaged socioeconomic contexts might dampen the well-being gains brought about by higher education endowments since they might fail to offer the institutional and market features necessary to generate them. Analogous research questions have been previously addressed in labour economics. For instance, Kimmel (1997) shows that wage returns to education among US rural workers are lower for American Indian men and black women. Instead, Ammermüller and Weber (2005) find that over the period 1985 -2002 the returns of tertiary education are mildly lower in East Germany as compared to West Germany. Brunello et al. (2017) show that the effect of education on lifetime earnings is lower for individuals with fewer books at home, which are related to parental cultural and economic conditions as well as their investments in children skill formation.

Our main analysis draws data from the first two waves of CHARLS, which is based on a sample representative of the Chinese population aged 45 or over. Most of the lives of the individuals in our sample has been shaped by the strict hukou regulations and by the duality in social policies generated by the hukou system. We estimate OLS and quantile regressions to assess the education differentials in well-being of older Chinese as well as whether and how these differentials vary with the hukou status. Our results show that higher education is associated with higher well-being levels late in life. Higher investments in education are found to have a positive lifetime effect on well-being. However, the education differentials are higher in the sample of urban hukou holders. This evidence is consistent with the hypothesis that the more generous are the opportunities made available by the State in terms of social policies, the higher are the gains that individuals can achieve from higher education. When higher educational attainments match the opportunities provided by more

qualified jobs and more generous health care provision, the well-being returns to education amplify. Comparing the education differentials in well-being at different quantiles of the well-being distribution suggests that the role of education in shaping well-being late in life is stronger for individuals who rank worse. Indeed, the educational gradient in well-being is overall wider at the first quartile than at the third quartile of the well-being distribution. This pattern suggests a redistributive effect of financing education and promoting higher education access among individuals with less affluent parental background. Our results indicate that public investments in education access are important devices to protect Chinese well-being late in life and that their well-being returns might increase if they are accompanied by efforts to remove the duality in social policies between rural and urban hukou holders.

ACKNOWLEDGEMENTS

We thank the participants at the Joint PhD Workshop Economics and Management First Paper Presentation (2016) at the Ca' Foscari University of Venice, VIU Summer School on Ageing (2016), Ca' Foscari – University of Groningen PhD Workshop in Economics (2016), Joint NIDI-RUG Workshop: Socioeconomic Differences and Health Later in Life (2016), Annual Meeting of the Association of Southern European Economic Theorists (2017) and at a seminar at the University of York.

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