A META-ANALYSIS OF THE ESTIMATES OF RETURNS TO SCHOOLING IN CHINA

Elaine Liu*, Shu Zhang
University of Houston

This paper performs a meta-analysis to investigate how changes over time, model specifications, differences in data sets, and variable definitions could contribute to the differences in estimates of returns to education in China. The results show that approximately 10 percent of the variation can be explained by changes in labor market over time, while the other 45 percent can be explained by differences in samples used and empirical methods. Return to education has increased approximately 0.2 percentage points a year since the economic reform, and increases more quickly as the reform progresses; however, this accelerating trend has reached a stop in the last few years when the global recession hit China. We also find that returns to education for rural-to-urban migrant workers are 2.3 percentage points lower than that of urban workers. We conclude that the increasing reward for human capital accumulation over time signals that China is moving toward a well functioning labor market.

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**Email:* emliu@uh.edu *Address:* Department of Economics, University of Houston, Houston, TX 77204.
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1. Introduction

The labor market reform is one of the most important aspects of China's market-oriented reform since the late 1970s. Prior to 1978, the wage system in pre-reform China deliberately compressed wage differentials across skill levels and occupations to provide egalitarian incomes for all workers. Under such a system, the conventional pattern of positive returns to education could not prevail. As China drifts away from the planned economy, returns to education are likely to rise. Return to education can be an indicator to assess the progress of the reform.

Earlier studies conclude that returns to education in China until the mid-1980s were non-existent or close to zero (Byron and Manaloto, 1990; Jamison and Van Der Gaag, 1987; Gregory and Meng, 1995; Knight and Song, 1991). More recent studies find a positive return to schooling as high as 10.2% (Li, 2003; Heckman and Li, 2004; de Brauw and Rozelle, 2008; Giles et al., 2007; Zhang et al., 2007; Maurer-Fazio, 1999; Li et al., 2012). However, it would be too hasty to conclude that China's labor market functions as well as those in market economies. The differences in estimation can arise even without an improvement in the true return to education. For example, more recent works often use more sophisticated econometric estimation techniques—such as instrumental variable analysis, or twin studies with family fixed effects. More recently collected datasets can also have more clearly-defined wage variables.

The objective of this paper is to determine the extent to which the variation in estimates for returns to education from different studies could be due to the difference in estimation methods, sampling population, data collection, and most importantly, an improvement in labor market conditions in China. We decompose the reasons for an increase in returns to education using a meta-analysis estimation. To our knowledge, this is the first study to perform a meta-analysis on the returns to schooling in China. To construct the meta-data, we first conduct an extensive literature review focusing on papers that provide estimates for returns to education starting from 1975, and we find 43 relevant papers and 371 estimates for returns to education spanning from 1975 to 2008. We record the empirical method used, the

characteristics of the sample population, the year the data was collected and whether the regressions include specific sets of controls for each of the regression estimates. To extend the estimate to a more current period, we include our own estimations of return to education using the 1991 to 2009 waves of China Health and Nutrition Survey (CHNS).

We find that approximately 10 percent of the variation in estimates for return to education can be explained by changes in labor market over time, while the other 45 percent can be explained by differences in samples used and empirical methods. The returns to education are close to zero in both urban and rural areas in the early stage of reform, but they have increased at 0.21 percentage points a year in the past 30 years. More interestingly, we find that return to education increases more quickly as the reform progresses; however, this accelerating trend has reached a stop in the last few years when the global recession hit China. This increasing trend is similar for both urban and rural, male and female sub-samples. One note is that we also find that returns to education for rural-to-urban migrant workers are 2.3 percentage points lower than that of urban workers.

The rest of the paper is structured as follows. Section 2 provides the background of China's labor market before and after the reform separated by urban and rural areas. Section 3 provides an overview of the econometric framework used in the existing literature. Section 4 describes the dataset for meta-analysis and the estimates of returns to education using the CHNS dataset. Section 5 presents the results from the meta-analysis and Section 6 concludes.

2. Background of the labor market in China

The late political scientist Gordon White once said that of all planning aspects of China prior to the reform, "the allocation of labor resources is by far the furthest from the market mechanism" (White, 1988). In this section, we will provide some description about various reforms that took place in urban and rural labor markets.

2.1 *Urban Labor Market*

Before the market-oriented reform in 1978, the Bureau of Labor and Personnel had immense power since it was in charge of job assignments. For a typical urban resident, upon completing some education level, she would be assigned to work in one of the state agencies, which can be state-owned enterprises (SOE) or government institutions (Cai 2003). Her initial assignment of work unit would be determined by her education attainment, field of studies, and at times her family class origin.[1] Besides her work unit, she would be assigned as a factory worker/technician (*gongren/jigong*) or an administrative or managerial worker (*ganbu*). The initial assignment is extremely important since job change across work places or even within a workplace was very rare (Knight and Song, 1991).

Her wage was determined through a wage grade system: eight grades for factory workers/technicians and 24 to 28 grades for administrative and managerial workers (Meng and Kid, 1997; Zhang et al., 2005).[2] Being promoted to a higher wage grade depended on seniority (Knight and Song, 1991; 1999). Thus her monthly wages did not really reflect her ability and productivity. Her wage would be kept at a low level (Zhang et al., 2005), but she would receive various benefits and in-kind transfers, including food and housing rationing, free education for her family, medical care and pension.[3] Such a wage system ensured every urban worker a lifetime employment (as known as "iron rice bowl", *tiefanwan*), especially because employers could not recruit and dismiss workers freely (Meng and Kid, 1997).

[1] The family class origin depends on one's family background during China's Civil War with the *Kuomingtan*. Family class origin can be categorized into "Five Red Elements" (hongwulei), "Middle Class" or "Five Black Elements" (heiwulei). "Five Red Elements" refers to the families of revolutionary martyrs, revolutionary cadres, production workers, poor peasants, extremely poor and mid-lower peasants. The "Five Red Elements" enjoyed the highest social and political status as well as the most government-provided resources (including better education and employment opportunity) during the cultural revolution between 1966 to 1976. Middle class were pre-liberation peddlers and store clerks, and former middle-class peasants. "Five Black Elements" includes landlords, rich farmers and counter-revolutionaries. (Deng and Treiman, 1997).

[2] Various papers report different number of grades. Knight and Song (1991) report that factory workers were divided into 8 grades, technicians were divided into 17 grades and administrative and managerial workers (ganbu) were divided into 20 grades. This probably was due to the fact that the wage system was first established in 1956 and adjusted several times in 1963, 1971-1972, 1977-1978 and 1978-1979.

[3] Since wages were kept low, benefits and in-kind transfers were an important part of total income. However, market value of these benefits and in-kind transfers were difficult to estimate precisely, especially when the commodity markets hardly exist. We would like to point out that in most earlier studies on returns to education, the true returns to education in pre-reform China could be underestimated since these benefits and in-kind transfers could also depend on one's education level (Peng, 1992).

The urban labor market reform started in the late 1970s following the commodity market reform. We will describe the labor market reform from three dimensions: the introduction of labor contract, the wage reform and mass lay-off of workers from state-owned enterprises.

The introduction of labor contracts dismantled the "iron rice bowl" and allowed job mobility. Starting in 1983, graduates could choose either to be assigned by the Bureau of Labor and Personnel or they were allowed to seek employment opportunities in both state agencies and private firms (Brook and Tao, 2003). In the same year, a labor contract system was introduced to selected SOE new employees (Knight and Song, 1991).[4] A typical contract specified the duration, the responsibilities, and the benefits of employment. Most importantly, either party could choose not to renew this contract when it expired (Liu, 1998). In 1985, less than four percent of the urban labor force had a contract (Meng, 2004). In 1986, a new order was issued by the government and the new labor contract system gradually spread to all SOEs (Meng and Kidd, 1997). By 1995, nearly 40 percent of the urban labor force was under contract (Meng, 2000).

As for wage reform, the transition from a wage grade system to a more flexible wage system started in the early 1980s. Under the new wage system, the wage of each employee has three main components: basic wage (*jibengongzi*), functional wage *(gangweigongzi*) and floating wage (*jiangging*). The basic wage was derived from the old wage grade system; the functional wage depends on one's position in the firm; and the floating wage, which was determined at the firm level, was a flexible element that reflected individual performance and employer's profitability (Knight and Song, 2003). The share of basic wage declined rather slowly from 86 percent in 1978 to 56 percent in 1988 and to 47 percent in 1993.

The central government implemented a series of reforms in SOE aiming to improve the efficiency of the state sector. In particular, middle- and large-sized SOE and collectively-owned enterprises laid off over 25 million employees from 1997 to 2002 (also known as x*iagang*). Most of these workers were middle-aged workers with low skills and poor education (Maurer-Fazio and Dinh, 2004). The government

[4] In 1981, the earliest experiment of the labor contract was implemented in selected SOE in Guangdong, Jiangsu and Shanghai (Meng and Kidd, 1997). These labor contracts did not cover existing employees. (China Ministry of Labor and Social Security, 1998).

established re-employment centers to help the laid-off workers to find jobs. Employment was no longer guaranteed, and one's education level played an important role during this re-employment process and in the determination of their earnings in private sectors (Maurer-Fazio and Dinh, 2004). Those workers who could not find jobs in the first few years after being laid off received some governmental supports.[5, 6]

2.2 Rural Nonfarm Labor Market

Prior to the reform, both the rural agricultural and off-farm production were operated under a three-tier system. The three-tier system consists of three administrative and production tiers: People's commune (*gongshe*), brigade (*lv*), and production team (*shengchandui*).[7] Under the three-tier system, commune and brigade leaders determined all economic activities, including production plans, agricultural and industrial inputs, labor assignments and output distribution. Each individual was assigned to a production team and worked on a farm or at a local factory.[8] The rural non-farm sector did not play a major role in the pre-reform period. Most rural industries were opened and operated by local communes and brigades to provide sideline agricultural products and services, such as agricultural machinery, farm tools, chemical fertilizer and handicrafts (Meng, 2000; Zhang et al., 2004). For their off-farm work, farmers were paid under a work point system. Points were given to members for each day of work. The number of points a person could receive in a day was determined by his or her gender, age and health status (e.g. healthy, young men normally received higher points per day of work). Education and productivity were irrelevant for one's pay.

Starting in 1983, these collective enterprises (previously owned by a commune, brigade or production team) were renamed as Township and Village-owned Enterprises (TVE, *xiangzhenqiye*) and they were given more freedom in production planning, wage schedules and recruitment. TVE could hire

[5] The unemployment and social security systems were established in 1986, but they were not enforced until 1993. A small allowance was provided to SOE laid-off workers.

[6] There were many other concurrent reforms that can have some impact on the labor market, such as pension reform and the expansion of college education. Since they are not the focus of this paper, we do not discuss them here. Leung (2003) provides a detailed description of the pension reforms.

[7] People's commune was set up in the mid-1950s in rural China. The population of a typical commune ranged from 15,000 to 30,000 while the average size of a team was about 167 people. (Gregory and Meng 1995; Li and Zhang 1998)

[8] The term "enterprise" *(qiye)* was hardly used in pre-reform China because the term was connected to capitalism. These collectively-owned factories are the predecessors of town and village enterprises during the reform.

local off-farm laborers as full time employees, and this was possible because of the concurrent agricultural reform—known as the "Household Responsibility System" (Lin, 1992).[9] With the "household responsibility system" and the improvement in agricultural production efficiency, much of rural farming labor now became free. TVE absorbed a large portion of rural laborers and become a major employer in the rural non-farm labor market. Between 1978 and 2000, the number of rural non-farm worker grew from 21.8 to 151.6 million (Fleisher et al. 2003).[10] The work-point wage system in pre-reformed rural collectives was replaced by a piece-rate wage system under which monthly wages were determined based on individual work effort and enterprise profits (Meng, 1996; Fleisher and Wang, 2004).[11]

Prior to reform, rural-urban labor mobility was strictly prevented under the household registration system, also known as *hukou*. Since jobs were assigned centrally, without an urban *hukou*, a rural resident simply could not obtain a job in an urban area (Liang and Ma, 2003). Most people born into a rural community stayed there for their entire life. An important part of the reforms was the weakening of the household registration system. Starting in 1983, the central government gradually relaxed the restrictions on mobility, and rural residents were allowed to seek jobs in nearby urban enterprises. The restriction on rural-urban labor mobility was further relaxed when the government allowed rural residents to seek jobs in any city in the late 1980s and early 1990s (Cai, 2003; Fleisher and Yang, 2003; de Brauw and Rozelle, 2008).[12] As a result, a massive rural to urban migration has taken place. According to Zhao

[9] China's economic reform in the agricultural sector first started by introducing the "Household Responsibility System" (HRS). Each production team could now divide the collectively-owned land and rent out to its member households for up to 15 years (then extended to another 30 years in 1990s) (Wang, 2007). Under the "Household Responsibility System", households' responsibility to the government is to fulfill the grain procurement quota (*gongliang*). Households could make their own farming decisions such as the amount of input used, type of grains planted, etc, and any output above the quota could be sold in the market and households could keep the profits. Between 1978 and 1995, total grain yield increased 3% annually and rural household income increased 7.3% annually (Meng, 2000).

[10] While the government did encourage skilled craftsmen to establish their own businesses in 1983-1985 (Fleisher and Yang 2003; de Brauw et al. 2002), the share of the labor force that worked in private sectors for both rural and urban areas was still less than 1 percent by the late 1980s (National Bureau of Statistics, 1990).

[11] Byrd and Lin (1989) provide more elaborate details about the post-reform rural industry.

[12] Several major reforms are relevant for labor mobility as follows: in 1985, the procurement quota was replaced by the new purchasing contracts between the state and rural households. Under the new system, rural residents do not have the obligation to fulfill the grain production quota (Fleisher and Yang, 2006). Second, starting in 1986, the

(2000) and Meng et al. (2010), the estimated number of rural-urban migrants is approximately 12.1 million during 1980-1985 and this number reached 38.9 million in 1997.[13] Starting in 1997, the migrants with stable source of income and housing could apply for urban *hukou*, but this policy was mainly applied to small towns and medium-sized cities. In most provincial capital cities and metropolitan areas, such as Beijing and Shanghai, the chance of obtaining an urban *hukou* for rural migrants is still very slim (Brook and Tao, 2003; Fleisher and Yang, 2006). By 2000, an estimated 61.3 million rural residents had moved to urban areas, while this number reached 125.8 million by 2006 (Meng et al., 2010).

A few studies suggest that rural migrants are being discriminated against in the urban labor market. Using the data collected in Shanghai in 1995/1996, Meng and Zhang (2001) find that rural migrants mostly take jobs that the urban residents are unwilling to take. Even when the rural migrants work in the same enterprise as the urban workers, they are also paid less. While the Chinese government passed laws protecting workers in the late 1990s and 2000s, including regulations on contract, insurance, work hours, etc., Frijters et al. (2010) use data from 2008 and find that rural migrant workers still work longer working hours and receive lower wages and worse remuneration packages compared to their urban counterparts. Using a 2002 dataset, a study by Demurger et al. (2009) tries to break down urban residents' and migrants' earning differentials, and they suggest that most of the differences in migrant and urban workers' earnings can be explained by the differences in individual characteristics—such as education.

Figure 1 plots the distribution of full-time workers at SOE, TVE and private sectors. As shown in Figure 1, prior to the reform, SOE were the biggest employers and absorbed nearly 80% of urban labor. In

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central government started issuing identification cards (*shenfenzheng*) and rural citizens with a legal I.D. card could freely migrate to cities. In 1993, the urban food rationing system was abolished and migrants with rural *hukou* could buy food and other goods in urban commodity markets (Cai, 2003). However, even today there are still other institutional barriers stopping rural residents from moving to urban areas. For example, only those with urban *hukou* can send their children to urban public school and enjoy urban resident health insurance. For difficulties faced by migrant workers see Chapter 2 and Chapter 5 of Meng, Manning, Li and Effendi (2010).

[13] According to the National Bureau of Statistics (NBS) and the Ministry of Agriculture (2001), the total "floating population" (*liudongrenkou*) was approximately 20 million in 1983 while this number reached 30 million in 1987 and 70 million in 1995. Comparing to the official statistics, the estimates from Zhao (2000) and Meng et al. (2010) seem small. However, the "floating population" in the official NBS statistics covers all internal migrants—including rural-rural, rural-urban and urban-urban migrants (Duan and Sun 2006).

comparison, the private sector did not become a major hiring force in the labor market until the late 1990s. Figure 2 displays the trend of average wage by ownership units over time.[14]

3. Mincer Equation and Returns to Education Literature in China

The standard labor economics model of estimating returns to education is the Mincer equation (1974):

$$\ln(y_i) = \alpha + \beta S_i + \lambda X_i^{'} + \mu_i \qquad (1)$$

where y_i is the earnings of individual i, S_i is a measure of schooling, X_i' is a vector of covariates such as experience and the quadratic term of experience, and μ_i is an error term. The main outcome of interest in this study is β, the coefficient on education. Among the papers estimating the Mincer equation in China, several empirical methods are employed, and we discuss their methodologies in detail in this Section.

3.1. OLS estimation and Unobserved Ability

The basic assumption of OLS estimation for Mincer equation (1) is that the explanatory variables are uncorrelated with the error term, μ_i. However, this assumption may be violated. For example, individual ability, which could be a determinant of wage, is missing from the Mincer equation. Ability can be correlated with education, which leads to a biased estimate of β. One approach to resolve the potential bias is to directly control for ability using some proxies. The proxies that have been used include parental education and parental income (Heckman and Li, 2004; Li and Luo, 2004; de Brauw and Rozelle, 2008; Giles et al., 2007). However, the inclusions of these proxies are not without criticism. There could still be aspects of ability that are not captured in one's parental education/skills.

3.2. Twins data and Other Unobserved Variables

[14] Zhang et al. (2005) provides an extensive overview of returns to education for state sector, collective sector and non-public (non-state) sector from 1988-2001. According to their estimates, the return to education in the private sector was higher than that of state and TVE sectors during this period. Private firms have more flexibility in labor hiring and wage schedule and the scale of the private sector grew quickly.

In addition to ability, other unobserved family characteristics could also be correlated with individual education level and earnings. One innovative approach that attempts to address this issue is the use of twins samples. The key idea of twins studies is that monozygotic twins should be similar in family upbringing and genetically determined ability. Unobserved differences that bias our estimate of β can be eliminated with the use of family fixed effects.[15] This approach has been pursued in estimating the return to education in the United States and the United Kingdom (Ashenfelter and Krueger, 1994; Behrman et al., 1994; Ashenfelter and Rouse, 1998; Bonjour et al., 2003).

In China, the datasets including large numbers of twins were not available until the Chinese Twins Survey (Li et al., 2007; Zhang et al., 2007; Zhang et al., 2012). The Chinese Twins Survey was conducted by the National Bureau of Statistics (NBS) in summer 2002 in five cities (Chengdu, Chongqing, Harbin, Hefei and Wuhan). It contains information on earnings, education, and job tenure for 488 pairs of monozygotic (MZ) twins and 322 pairs of non-identical (DZ) twins.[16] One potential problem with twin studies is that measurement error problems can be exacerbated by fixed-effect estimates. The Chinese Twins Survey follows Ashenfelter and Krueger's US Twins Survey design (1994) by asking each twin to report their own education level as well as their co-twin's education level.

With the Chinese Twins Survey, Zhang et al. (2007) and Li et al. (2007) both use the twins dataset to estimate various versions of Mincer Equation. In order to deal with the measure error issue, Li et al. (2012) use the cross-reported education by the other twin to instrument for the self-reported education level.

3.3. 2SLS and Natural Experiment

Another approach used to improve on OLS estimates is two-stage least square method (2SLS). This approach requires an instrumental variable that is related to one's education level, but is orthogonal

[15] In fact, the variation in education level between twins may be endogenous. For instance, the between-twin difference in birth weight is correlated with their IQ and schooling. See Bound and Solon (1999) and Neumark (1999) for more discussion.

[16] They consider a pair of twins to be identical if both twins respond that they have identical hair color, looks and gender.

to one's ability. Instruments used in the previous studies include quarter of birth interacted with year of birth (Angrist and Krueger, 1991), a school expansion program (Duflo, 2002), and geographical distance to schools (Kane and Rouse, 1993; Card 1995).

In the context of China, both Fleisher and Wang (2005) and Giles et al. (2007) use the differential impact of the Cultural Revolution (CR) across time and geographic variation in China as an instrumental variable for years of schooling. During the Cultural Revolution from 1966 to 1976, formal education was disrupted. Many universities were closed for six years and some age cohorts missed as much as eight years of schooling (Meng and Gregory, 2002a). Rural schooling was less affected than urban schooling (Meng and Gregory, 2002b). Since there are differences in educational disruption across age cohorts and rural/urban areas, Fleisher and Wang (2005) instrument years of schooling with birth year, location (rural, small town, medium-size city or metropolitan area), a dummy variable indicating whether any normal high-school years occurred during the CR and interaction terms between the location and CR-year variable.

Giles et al. (2007) note that besides the variation in time and location, family background was also a key factor in determining the impact of CR on schooling. For example, the children of "Five Black Elements" were hit harder than the children of "Five Red Elements"[17], and the children whose parents had administrative status (*ganbu*) were less likely to be sent to the countryside. Giles et al. (2007) construct different education disruption measures as instruments based on one's birth place, birth year and parental administrative status.[18]

3.4 Selection Bias

One possible source of bias in estimates of the returns to schooling is selection bias (Heckman and Li, 2004; de Brauw and Rozelle, 2008; Wang et al., 2009). One example of this is that people sort into school based on the heterogeneous return to schooling. For example, those who attend college are the

[17] See Footnote 1 for more discussion.
[18] Meng and Gregory (2002) also study the impact of disrupted education during the CR on adult earnings. Since they could not control for unobserved cohort differences that are correlated with workers' experience of schooling, shock and workers' productivity, their findings cannot be extrapolated beyond the impact of the CR on earnings for that particular cohort.

ones who know that they will receive higher return to schooling. Using semi-parametric methods, Heckman and Li (2004) allow for heterogeneous returns among individuals selecting into schooling based on these differences. Heckman and Li (2004) find that the heterogeneity in returns is substantial in the population. OLS gives a downward biased estimate of the average treatment effect. Wang et al. (2009) use the same methodology as Heckman and Li (2004) but with a different dataset.

de Brauw and Rozelle (2007) suggest another type of selection bias. An individual will not enter a labor market if his or her reservation wage is higher than the wage offered. The distribution of wages is left truncated, thus the OLS estimates will be biased if not correcting for the selection bias. To account for the bias, they apply a two-stage Heckman correction method.

4. Meta-Dataset and Summary Statistics

In order to construct the meta-dataset, we performed a literature search on the Social Science Research Network (SSRN) to identify studies that use the Mincer equation to estimate the returns to education in China. We further expanded the list by including any relevant papers mentioned in the set of papers we found from SSRN. We found 43 papers that estimate returns to education in China spanning the period from 1975 to 2008.[19]

In Table 1, we present the estimates by whether the sample populations are urban, rural or migrants.[20] The estimates reported in Table 1 are either taken directly from the most comparable estimation from that study, or they represent the average across several specifications within the same study.[21] For those studies that use a set of level of education attainment dummies, instead of years of

[19] A paper by Fleisher et al. (2011) is not listed in Table 1 and is excluded from our analysis even though they have some estimates of returns to schooling, because the approach is quite different from what we have discussed above. Unlike the rest of the papers using individual level data to estimate returns, Fleisher et al. (2011) estimate marginal product of skilled labor (MPL) in Cobb-Douglas function and impute the returns to education using MPL.

[20] To our knowledge, there are very few datasets that would allow one to examine the returns to education for a migrant population. In recent years, the most structured and representative migrant dataset is the Rural-Urban Migration in China and Indonesia (RUMiCI) project. It is a dataset that starts in 2008 and will contain five rounds of longitudinal surveys on migrant workers. More information can be found at: http://rse.anu.edu.au/rumici/.

[21] For example, Johnson and Chow (1997) present three estimates for returns to education in urban areas. The first one is the basic OLS, and the second includes an interaction term between being a member of the communist party and work experience, and the third one includes an interaction term between female and schooling. We choose to

schooling, as independent variables, we annualize the returns across education categories (university, high school, middle school and elementary school) to get the average return for a year of schooling. We only include the rural studies if they pertained to the off-farm sector.

To provide a more current measure of the return to schooling, we estimate Equation (1) using the dataset from the China Health and Nutrition Survey (CHNS). The CHNS is a panel survey which covers approximately 16,000 individuals in nine provinces in the years 1989, 1991, 1993, 1997, 2000, 2004, 2006 and 2009.[22] The 1989 data is excluded from the analysis since the format of the questions on wages was changed, making it less comparable to that of later years. The OLS estimates of returns to education for both urban and rural areas are provided in Table 2. Table 2 shows that returns to education increase over time for both urban and rural off-farm sectors and this increasing trend came to a stop in 2009. We incorporate these estimates into our meta-dataset.[23]

Most studies listed in Table 1 have multiple estimates of returns to schooling. For each estimate, we would record the model specification (IV, OLS), special correction (ability controls, correction for selection bias), the choice of the dependent variable[24] (hourly wage, monthly/annual wage, includes in-kind transfer, subsidies), sample used in regression (female only, male only, pooled; urban only, rural only, migrant only; twin), the choices of controls (occupations dummies included, industry dummies included, work unit dummies included) and the year the dataset was collected. For example, Zhang et al. (2005) estimate the return to schooling for each year from 1988 to 2001. Their study also provides estimation results using alternative specifications such as controlling for industry dummies and

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only present the estimate from the basic OLS without any interaction terms, which is more comparable to that of other studies.

[22] The China Health and Nutrition Survey (CHNS) is a project between the Carolina Population Center and the Chinese Center for Disease Control and Prevention. The survey uses a multistage, random cluster sampling process.. CHNS contains detailed demographic, socioeconomic and health information for 4,400 households with a total of 26,000 individuals.

[23] Unfortunately, we are not able to test the difference between IV and OLS estimates using this dataset due to the absence of a good instrument.

[24] Several authors suggest that hourly wage is better than annual or monthly earnings because it does not depend on the number of hours worked (Shultz, 1988; Card, 1999). In particular, Li and Zax (2004) find that less educated individuals work more in China. Without taking work hours into account, we may underestimate the return to education. Thus, the choice of dependent variable matters. Moreover, earning can be broadly defined to include bonuses, subsidies and in-kind transfers as a part of total earning. In the appendix table, we show that inclusion of bonuses, subsidies and in-kind transfers does not have a significant impact on estimates for returns to education.

occupation dummies, and separating by gender and different sectors. Therefore, we include a total of 112 estimates from this study into our meta-dataset, but each of the estimates is unique in some dimension in our meta-dataset. In order to assign the same weight to all studies, we create a weighting function which is inversely proportional to the number of estimates included from a given study. It is also notable that a large fraction of the urban studies use a dataset from 1988. This is because only a handful of micro-level datasets are suitable and accessible and can be used to estimate returns to education in China.[25]

Table 3 reports the descriptive statistics for the meta-dataset, broken down by urban and rural areas. The earliest year that the data covers is 1975 in the urban areas (pre-reform) and 1986 in the rural areas (post-reform). The average number of observations in a regression is 3,309 and the average return to schooling is 4.8 percent. There are a few other noteworthy aspects of this table. First, the average return to each year of schooling in urban area is about 2.8 percentage points higher than that of the rural off-farm sector.[26] Second, none of the IV and twins studies were conducted using a rural dataset. There is also no rural study that includes industry dummies and estimates for employees in SOE and private sectors and rural migrant workers. There are very few studies with migrant samples, so we cannot examine the trend of return to schooling for the migrant population. Despite that we discuss the potential bias associated with using annual/monthly earning as the dependent variable, only 30 percent of estimates use log of hourly wage as the dependent variable. In many of the earlier surveys, hours worked are simply not available. In our analysis, we examine whether using hourly wage as opposed to annual/monthly income would affect the estimates for returns to education.

[25] For example, the dataset from the Chinese Household Income Project (CHIP) was one of the most popular choices for estimating the Mincer equation. It covered four cross-sectional datasets collected in 1988/89, 1995/96, 1999/2000 and 2002/2003. The sample consists of 17,000 workers in 10 provinces in 1988, 10,913 workers in 11 provinces in 1995, 6,281 workers in six provinces in 1999 and 9,791 workers in twelve provinces in 2002. It was collected by the Institute of Economics at the Chinese Academy of Social Science.

[26] In studies that measure education using a set of dummies for level of attainment, instead of years of schooling as the independent variable, we first sum over rates of return on dummies (university, high school, middle school and elementary school) and annualize the sum to estimate the average return to additional year of schooling.

In the next section, we provide the meta-analysis to examine whether the difference in estimations among studies can be explained by various model specifications, the passage of time and differences in datasets.

5. Meta-Analysis of the Returns to Schooling Literature

5.1. Meta-Analysis Regression Strategy

Meta-regression analysis is a quantitative method used to analyze a body of related empirical literature (Stanley and Jarrell, 1989). One advantage of meta-analysis is that it allows us to quantify the changes in coefficient estimates due to differences in empirical specifications used across various studies . For example, we can estimate the effect of the inclusion of occupation or industry dummies, or the impact of using IV as opposed to OLS on returns to education. It also allows us to examine how returns to education have evolved over time by surveying the vast literature in returns to schooling.

Figure 3 plots the returns over time from the studies included in the meta-analysis; each point represents one observation. The figure reveals an upward trend of returns to schooling over time. The few outliers on this figure are from either Heckman and Li (2004) or Wang et al. (2009). As we discuss in Section 3, both of these papers correct for selection bias and more importantly, they estimate the returns to schooling for college students. It is likely possible that returns to per-year schooling are much higher at college level. In Figure 4, we plot the returns by the area of sample population (urban vs. rural), empirical model (OLS vs. IV) and gender (male vs. female), and this upward trend can be observed in each of the subgroups. Therefore, we include a time factor in our meta-regression.[27]

The meta-regression model can be expressed as follows:

$$\beta_{ijt} = \gamma_o + \gamma_1 (t - 1975)_{ijt} + \pi Z'_{ijt} \qquad (2)$$

where β_{ijt} is the estimated returns to each year of schooling for study i and specification j using dataset from year t. We subtract t from 1975, the first year in which return of education is estimated. γ_1 estimates

[27] While it may appear that heteroskedasticity exists, it is possibly due to the fact that very few studies cover the earlier period.

the change in returns to schooling across years. Z'_{ij} is a vector of independent variables including ability bias control, selection bias control, the use of instrumental variables, twin method, hourly wages as dependent variable, occupation, industry, work unit dummies and the specific dataset (CHIP), urban, male, female, and migrant dummies indicating whether the estimate is for a specific sub-population. Since there are usually multiple observations from each study, unless otherwise noted, the regression standard errors are clustered at the study level. As mentioned earlier, the weight of each observation is inversely proportional to the number of estimates included in each study, so in each regression each study should have the same weight.

5.2. Main Results:

Table 4 reports the results for estimating Equation 2. Column 1 estimates Equation 2 exclude the time trend, Column 2 estimates Equation 2. We find that differences in econometric specifications alone account for nearly 45 percent of the variation in estimates for returns to schooling. When we include the time dimension, we can explain an additional 10 percent more of the variation. Coefficient on time dimension suggests that returns to education increase at 0.21 percentage points a year between 1975 and 2009.

Returns to education that are estimated using instrumental variables are about 3.2-3.6 percentage points higher than those from OLS. Those studies which use hourly wage instead of annual/monthly earning as a dependent variable find higher returns to schooling. We should also note that most of the studies with hourly wage available are collected more recently, so once we control for time, this coefficient becomes insignificant in Column 2. There are three papers controlling for selection bias (Heckman and Li, 2004; Wang et al., 2009; de Brauw and Rozelle, 2008), and the coefficient on selection bias is positive and significant. However, one should be cautious to interpret the coefficient as if it is only due to the selection bias. While all other studies estimate returns to schooling for all levels of education, two out of three papers that correct for selection bias estimate returns to schooling for university students. It is possible that return to per-year schooling is higher for college than other levels, thus the positive

significant coefficients on selection bias are partly due to the college student bias. We include a set of dummies indicating whether a study controls for occupation, industry and work unit (SOE, TVE or Private). Since occupational, industry and work units are various channels by which education can affect wages, the inclusion of these dummies also affects one's estimates in returns to schooling. Fifteen out of 44 studies use the CHIP dataset, so we include a dummy for that, but it is not significant. The estimated return to education in urban areas is about 2 percentage points higher than in the rural areas. Male and female dummies indicate if this estimate is specifically for male or female, and the default is the pooled sample. Return to education for male is negative but significant suggesting that return to education for female is probably higher than male.[28] The migrant dummy equals 1 if the sample population is rural-urban migrant workers. The return to education for rural migrants is 2.39 percentage points lower than non-migrant workers.

Since returns to education have been increasing over time, it would be interesting to see if this increasing trend has slowed. Column 3 includes a quadratic term for the time variable. If this term has a positive sign, it means that returns to education accelerate in the period of our study. The coefficient on the quadratic time variable is positive but insignificant. With the consideration of the recent global recession, we exclude the estimates from year 2008 and 2009 in Column 4. It shows that the year square term is significantly positive, which indicates that the trend of increasing returns to education is accelerating until 2007, when it reaches a stop.[29]

In Table 5 we examine whether this increasing trend differs by subsample. Table 5 Columns 1 and 2 report the results separated by urban versus rural samples; Columns 3 and 4 report results for male and female samples. The returns to schooling increase slightly faster in rural areas than urban areas, and return to schooling increases faster for female than for male. One striking pattern is that migrant male

[28] The finding of higher returns to female education has been documented in the previous literature (Psacharopoulos, 1994; Li, 2003; Zhang et al., 2005). This difference could be partially due to the greater positive self-selection of women into the labor force compared to men (Zhang et al., 2005), and also due to the under-supply of educated women on the labor market (Li, 2003).

[29] In the appendix we provide some alternative specifications where we do not use sample weight or do not cluster standard errors, and we find consistent patterns.

workers receive about 5 percentage points lower returns to schooling than non-migrant male workers; migrant female workers' returns to schooling are about 6 percentage points lower than non-migrant female workers.

In Table 6, we want to investigate the non-linearity of the increasing return to schooling over time. We restrict our sample to only those using an urban, non-migrant sample and divide estimates into 4 periods: 1975-1988, 1989-1995, 1996-2002 and 2003-2009.[30] We did not use a sample weight nor cluster the standard errors since there is one paper that produced returns to education for an urban non-migrant sample after 2003. Our findings suggest that during the early period of reform in 1975-1988 and 1989-1995, the returns to education increased at 0.299 percentage and 0.236 percentage points per year, respectively.[31] Between 1996 and 2002, the returns to education increase at 0.50 percentage points a year, but eventually it plateaus in more recent years. In Column 5, we extend the period in Column 3 until 2006, and we still find a positive trend even until then. Since there is no data on 2007, we can infer that the negative insignificant sign in Column 4 is driven by estimates from 2008 and 2009 when the global recession affected China.[32]

6. Conclusion

This study examines the trend of returns to education in China from 1975 to 2009 by performing a meta-regression analysis using estimates from over 40 studies. Nearly 45 percent of the variation in returns to education is due to the differences in econometric specifications from studies, and time progression can explain about 10 percent of the variation. At the onset of the reform, return to

[30] This division is based on the consideration of important policy changes and sample size issue. For example, 1975-1988 is the early stage of reform and many studies use data in 1988. Around 1987 there was a contract law reform, and after 1987 the rural-urban migration restriction was gradually relaxed. Around 1997 most large- and medium-sized SOE laid off many unskilled workers (*xiagang*) and another wave of wage system reform took place in all state sectors.

[31] These two coefficients are not statistically different from each other.

[32] We also add three dummy variables—"Bonus Included", "Subsidy Included" and "In-kind Transfer Included" into our meta-regression, to indicate if wage measure includes bonus, subsidy or in-kind transfer. However, none of these variables is significant and results are reported in the Appendix Table. A small set of papers examine return to education by work unit (state-owned enterprise, town-village-enterprise and private enterprise). Regression results reported in the Appendix suggest that the return to education in private sector is significantly higher (2.2 percentage points) than those in SOE, and return to education in TVE is 0.93 percentage points lower than SOE.

education was close to 0, but it has been increasing at 0.2 percentage points per year in the past 30 years. Our empirical results show that this upward time trend persists in both urban and rural areas and for both male and female. More importantly, for urban workers, this increasing time trend showed no sign of abating until 2008 and 2009 when the global recession began to affect China. Our empirical results show that this upward time trend persists in both urban and rural areas and for both male and female. However, it ought to be of interest and concern to policymakers that rural-to-urban migrant workers receive much lower return to education compared to their urban counterparts.

An extrapolation of the existing trends into the year 2015 gives the predicted return of 8.44 percent. The magnitudes of these returns are equal or close to the levels observed in other Asian countries during the period of the 1970s and 1980s (Psacharopoulos, 1994). Increasing rewards for human capital accumulation is a positive sign that suggests China is moving gradually towards a market economy.

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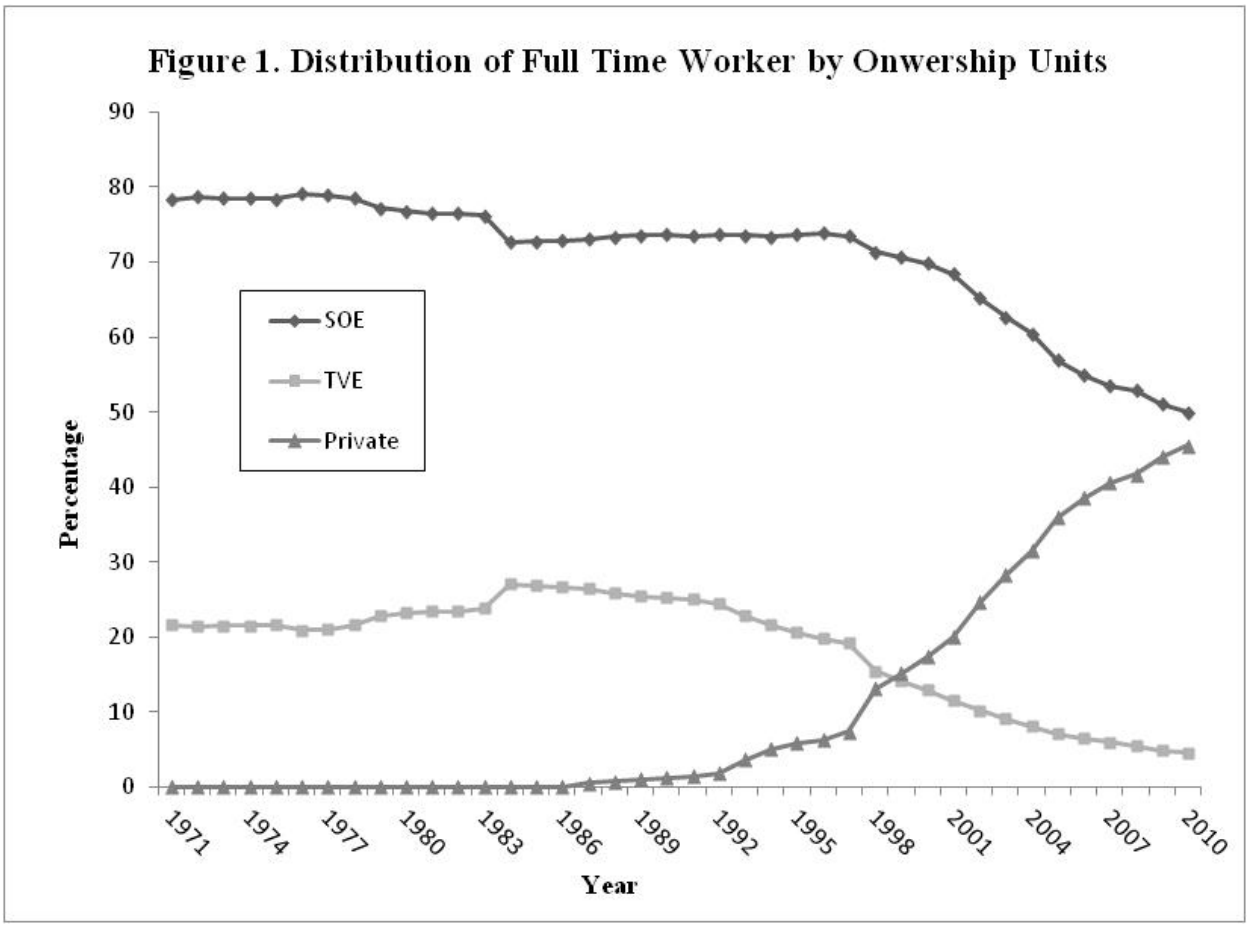
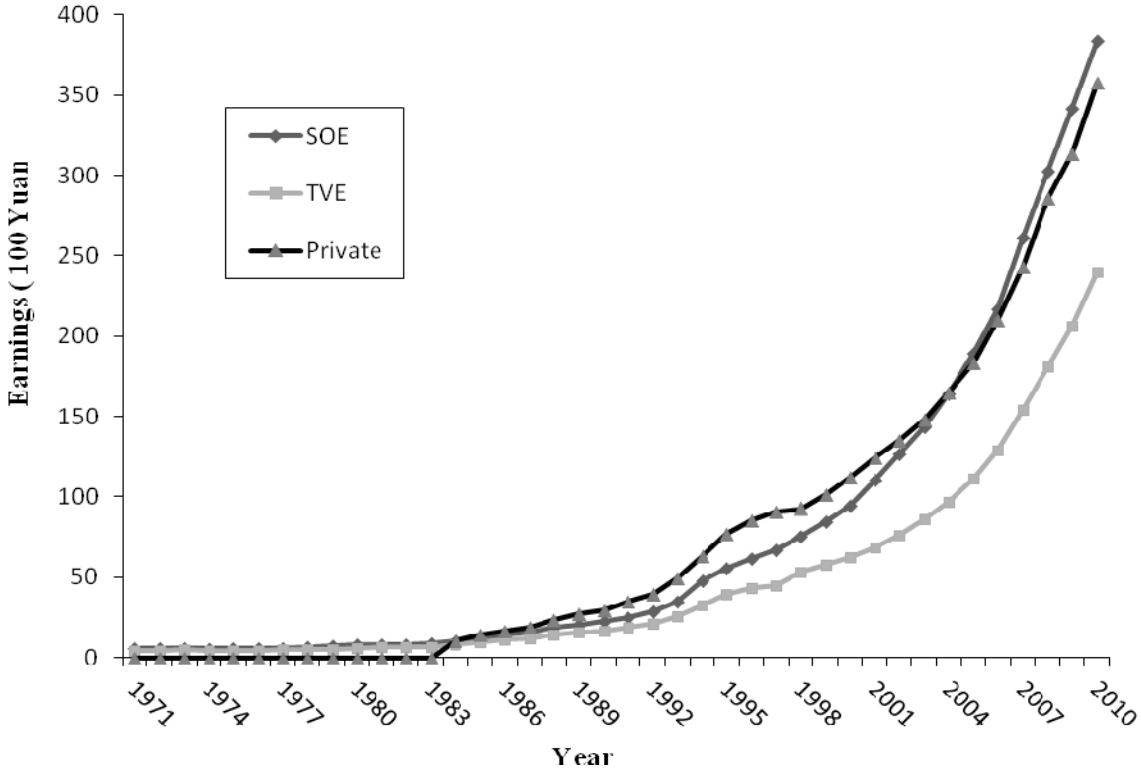
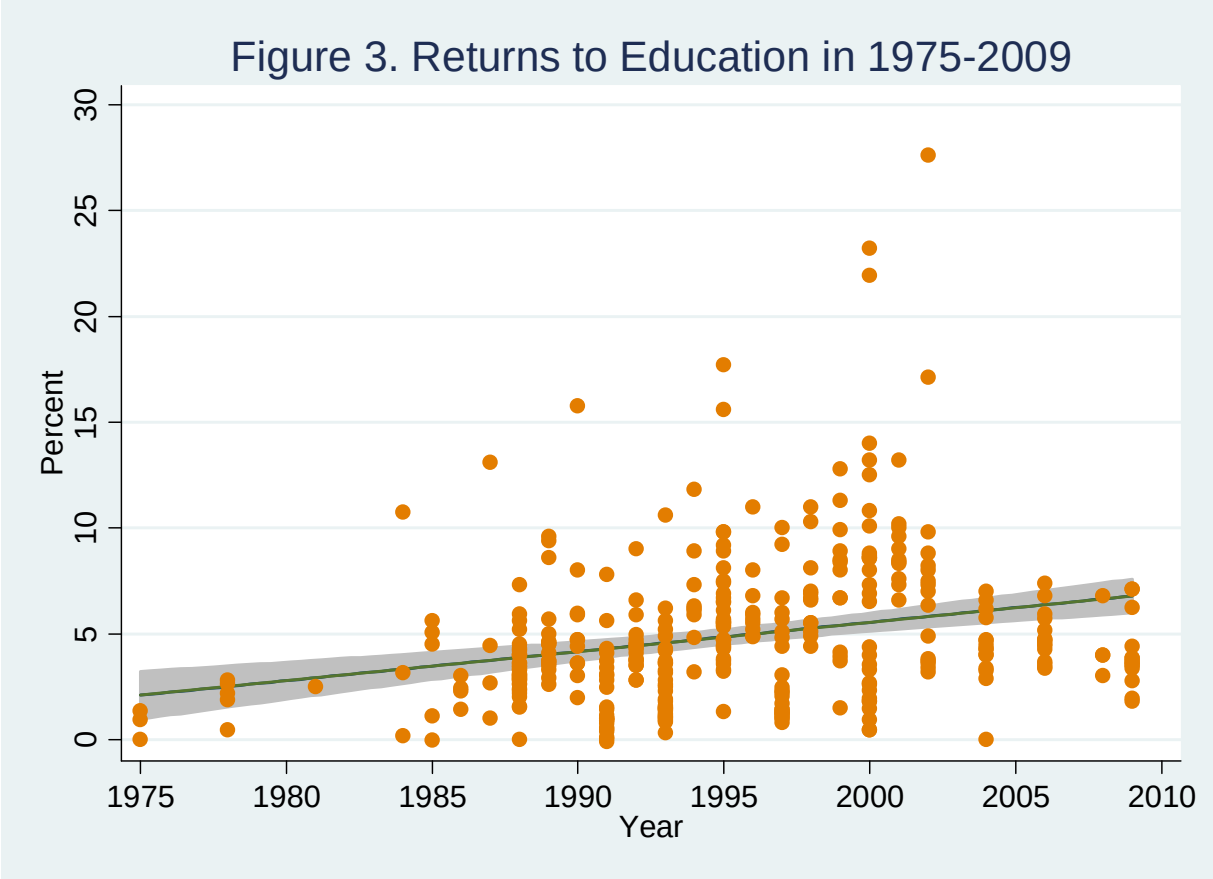


Source: China Labor Statistical Yearbook (2011)

Figure 2. Average Annual Earnings of Staff and Workers by Ownership Units

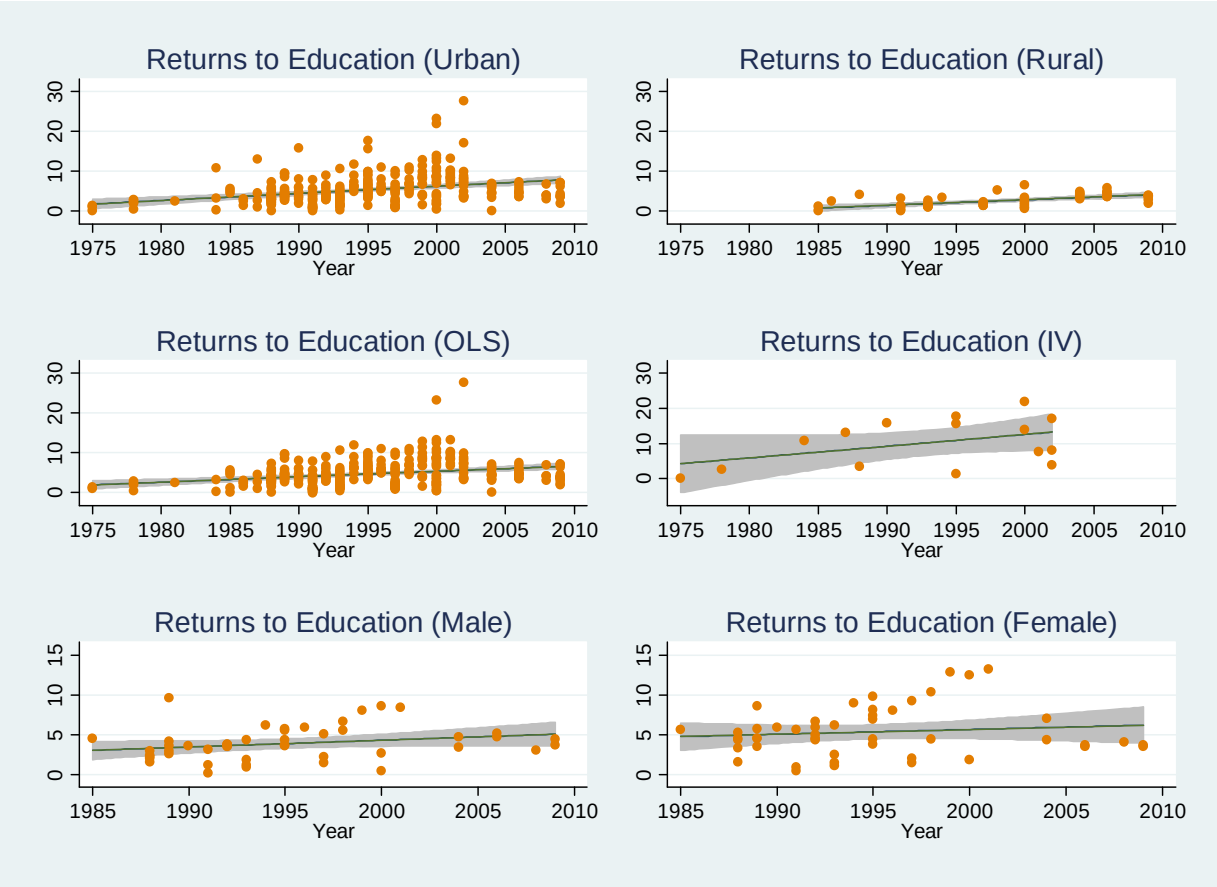


Source: China Labor Statistical Yearbook (2011)



Note: The outliers are from Heckman and Li (2004) and Wang, Fleisher, Li and Li (2009). In both of these studies, they correct for selection bias and they estimate returns to education for college students.

Figure 4 Returns to Education from 1975-2009: by region, model and gender



Note: We plot those estimated returns by region, empirical model and gender. In the upper panel, returns in urban areas increase more quickly over time than returns in rural areas; in the middle panel, OLS estimates are generally smaller than IV estimates; in the bottom, female's returns to education increase faster than male's.

Table 1.A: Studies Estimating Returns to Education in Urban China

Study	Years Covered	Methodology and Comments	OLS
Fleisher and Wang (2005)	1975, 1978, 1984, 1987, 1990	IV, Retrospective data	1.37 - 5.97
Zhou (2000)	1975, 1978, 1984, 1987, 1991, 1993	OLS	0.1 - 1.0
Zhou and Zhao (2002)	1978, 1993	OLS	1.8-3.4
Meng and Kidd (1997)	1981, 1987	OLS	2.5 - 2.66
Jamison and Van Der Gaag (1987)	1985	OLS	5.05
Byron and Manaloto (1990)	1986	OLS	1.43
Knight and Song (1991)	1986	OLS	2.44 - 3.03
Johnson and Chow (1997)	1988	OLS	3.29
Liu (1998)	1988	OLS	2.91 - 3.61
Knight and Song (1995)	1988	OLS	2.34
Xie and Hannum (1996)	1988	OLS	2.2 - 4.5
Bishop, Luo and Wang (2004)	1988, 1995	OLS	1.54 - 4.43
Knight and Song (2005)	1988, 1995	OLS	2.65 - 5.34
Maurer-Fazio (1999)	1988, 1991	OLS	3.70 - 4.34
Hauser and Xie (2005)	1988, 1995	OLS	2.0 - 7.4
Yang (2005)	1988, 1995	OLS	3.48 - 6.46
Zhang et al. (2005)	1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001	OLS	4.0 - 10.2
Wang, Fleisher, Li and Li (2009)	1988, 1995, 2002	OLS	1.3 - 27.6[a]
Appleton, Song and Xia (2005)	1988, 1995, 1999, 2002	OLS	3.6 - 7.5
Fleisher, Dong and Liu (1996)	1990	OLS	1.99
Fleisher and Wang (2001)	1991	OLS	1.44
Li (2003)	1995	OLS, Using hourly wages	4.7 - 5.4
Li and Luo (2004)	1995	OLS, IV	7.5 - 15.6
Huang, Caldas and Rebelo (2002)	1995, 1998	OLS	3.8 - 5.5
Knight and Li (2005)	1995, 1999	OLS	3.23 - 4.11
Wu and Xie (2003)	1996	OLS	5.2
Maurer-Fazio and Dinh (2004)	1999	OLS	3.7

Giles et al (2004)	2000	IV	8.3 - 9.6
Heckman and Li (2004)	2000	OLS, IV, Using proxies for individual ability, Correcting for selection bias	7.32 - 23.2[a]
Zhang, Liu and Yung (2007)	2002	Twins	3.8 - 9.8
Li, Liu, Zhang and Ma (2007)	2002	Twins	3.2 - 7.0
Li, Liu and Zhang (2012)	2002	Twins	8.2
Deng and Li (2010)	2008	OLS	5.59-6.80
Liu and Zhang (2012)[b]	1991, 1993, 1997, 2000, 2004, 2006, 2009	OLS	0.47 - 7.39

Note: a) These estimates are the return to schooling of university students.
b). this is our own estimation using CHNS survey.

Table 1.B: Studies Estimating Returns to Education in Rural China

Study	Years Covered	Methodology and Comments	OLS
Gregory and Meng (1995)	1985	OLS	Not statistically diff from 0
Knight and Song (1993)	1988	OLS	Not statistically diff from 0
Johnson and Chow (1997)	1988	OLS	4.02
Yang (1997)	1990	OLS	2.3
Wei,Tsang,Xu and Chen (1999)	1991	OLS	3.97
Parish et al (1995)	1993	OLS	3.05
Ho et al. (2002)	1998	OLS	3.2 - 5.0
de Brauw and Rozelle (2008)	2000	OLS	3.3-6.5
Liu and Zhang (2012)	1991, 1993, 1997, 2000, 2004, 2006, 2009	OLS	0.97 - 5.73

Table 1.C: Studies Estimating Returns to Education on Migrants

Study	Years Covered	Methodology and Comments	OLS
Meng and Zhang (2001)	1996	OLS	4.84
Maurer-Fazio and Dinh (2004)	1999	OLS	1.5
de Brauw and Rozelle (2008)	2000	OLS	8.0
Demurger, Gurgand, Li, Yue (2009)	2002	OLS	3.6-7.3
Frijter, Lee and Meng (2010)	2008	OLS	3.0-4.0
Deng and Li (2010)	2008	OLS	6.79

Table 2: Returns to Education in China from 1991 to 2009 using CHNS (%)

Year	(1) Basic Mincer	(2) Add Occupation	(3) Basic Mincer Use Hourly Wage	(4) Use Hourly Wage Add Occupation
urban				
1991	2.46	1.51	0.91	0.47
1993	3.15	3.26	1.59	1.37
1997	2.28	1.01	2.46	1.32
2000	3.54	1.81	4.00	2.34
2004	6.18	4.47	6.59	4.69
2006	6.80	4.43	7.39	4.74
2009	7.10	3.54	7.12	3.86
rural				
1991	0.97	1.00	0.05[a]	-0.10[a]
1993	1.22	1.41	0.96	0.84
1997	1.16	1.25	1.69	1.23
2000	2.61	1.46	1.95	0.93
2004	4.01	3.26	4.00	2.89
2006	5.73	4.25	4.64	3.37
2009	3.37	1.79	3.86	2.76

Note: Each return is derived from a separate regressions. In Column (1) and (2), the dependent variable is the log of monthly basic wage from the primary job. In Column (3) and (4), the dependent variable is log(hourly wage), and hourly wage is imputed using earning divided by hours worked. We restrict to sample older than 18. In Column (1), the covariates includes exp, $(exp)^2$, minority, female, province dummies and ownership dummies. Column (2) includes all covariates listed above plus occupation dummies. In Columns (3) and (4), the dependent variable is log (hourly wage). Column (4) adds occupation dummies.

a: Not statistically significant from zero.

Table 3. Summary Statistics

	All		Urban		Rural	
Variable	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Dataset Sample Size[a]	3309	3869	3700	4044	964	532
Year	1995	7	1995	7	1998	7
Estimated Rate (%)	4.80	3.59	5.20	3.67	2.41	1.62
Instrumental Variable[b]	0.04	0.20	0.05	0.21		
Twins[c]	0.01	0.12	0.02	0.12		
Ability Control[d]	0.05	0.22	0.05	0.23	0.04	0.19
Selection Bias[e]	0.04	0.20	0.04	0.20	0.04	0.19
Occupation Dummy[f]	0.36	0.48	0.33	0.47	0.55	0.50
Industry Dummy[g]	0.26	0.44	0.31	0.46		
Work Unit Dummy[h]	0.46	0.50	0.40	0.49	0.83	0.38
SOE[i]	0.10	0.30	0.12	0.32		
TVE[j]	0.09	0.29	0.09	0.29	0.08	0.27
Private[k]	0.08	0.27	0.09	0.29		
Migrant[l]	0.03	0.16	0.03	0.17		
CHIP[m]	0.17	0.38	0.20	0.40	0.02	0.14
Hourly Wage[n]	0.30	0.46	0.25	0.43	0.60	0.49
Bonus Included[o]	0.78	0.41	0.84	0.36	0.43	0.50
Subsidy Included[p]	0.60	0.49	0.68	0.47	0.08	0.27
In-Kind Transfer Included[q]	0.20	0.40	0.23	0.42	0.04	0.19
Number of Paper	44		39		9	
Number of Observations	371		318		53	

Note:
a) indicates the sample size for each observation
b) equals 1 if the study uses IV approach
c) equals 1 if the study uses twin fixed effect to estimate
d) equals 1 if the study controls for ability bias
e) equals 1 if the study corrects for selection bias
f) equals 1 if the study include occupation dummies
g) equals 1 if the study includes industry dummies
h) equals 1 if the study includes work unit dummies. Work unit dummies often refer to SOE, TVE and Private sector.
i) equals 1 if the estimated return is for employees of State-Owned Enterprises (SOE)
j) equals 1 if the estimated return is for employees of Township-Village Owned Enterprises (TVE)
k) equals 1 if the estimated return is for employees private sector
l) equals 1 if the estimated return is for rural-urban migrants
m) equals 1 if the study uses CHIP dataset
n) equals 1 if the study uses hourly wages as a dependent variable in earning functions estimation
o) equals 1 if the wage measure includes bonus
p) equals 1 if the wage measure includes subsidy which is related to the position
q) equals 1 if the wage measure includes in-kind transfer (housing and medical insurance)

Table 4: Meta Analysis of Returns to Education from 1975 to 2009

	(1)	(2)	(3)	(4)
	Add Migrant	Full	Year Square	Before 2008
Year[a]		0.211***	0.0652	0.0120
		(0.0445)	(0.0898)	(0.0761)
$(Year)^2$			0.00473	0.00713**
			(0.00302)	(0.00270)
Ability Controlled	-0.776	-1.002	-1.102	-1.122
	(2.129)	(1.917)	(1.908)	(1.930)
IV	3.213*	3.639**	3.528**	3.514**
	(1.615)	(1.668)	(1.692)	(1.694)
Twin	-0.983	-3.118***	-3.512***	-4.040***
	(1.225)	(1.140)	(1.079)	(1.004)
Hourly Wage	1.632**	0.232	0.103	-0.00941
	(0.660)	(0.677)	(0.673)	(0.667)
Occupation Dummies	-2.445***	-1.957***	-2.146***	-2.238***
	(0.671)	(0.539)	(0.529)	(0.532)
Industry Dummies	2.022**	1.282**	1.374**	1.203**
	(0.804)	(0.571)	(0.554)	(0.585)
Work Unit Dummies	-0.658	-0.782	-0.903**	-1.120***
	(0.600)	(0.471)	(0.431)	(0.408)
Selectivity Bias	5.000*	4.884*	4.907**	4.809*
	(2.758)	(2.441)	(2.405)	(2.451)
Using CHIP data	-0.261	0.0301	0.246	0.215
	(0.552)	(0.446)	(0.433)	(0.431)
Urban	2.309***	2.061***	1.944***	1.973***
	(0.632)	(0.571)	(0.561)	(0.562)
Male	-0.670	-0.992**	-1.050**	-0.697
	(0.435)	(0.455)	(0.490)	(0.477)
Female	0.532	0.347	0.339	0.739
	(0.455)	(0.490)	(0.510)	(0.456)
Migrant	-1.334	-2.391**	-2.892**	-2.671***
	(0.903)	(0.972)	(1.074)	(0.963)
Constant	2.338***	-0.730	0.324	0.542
	(0.387)	(0.711)	(0.790)	(0.689)
Observations	371	371	371	352
R-squared	0.453	0.559	0.571	0.597

Note: The dependent variable is estimated return to education. a) Year=0 if year equals 1975. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the study level.

Table 5: Returns to Education from 1975 to 2009 by Subsample

	(1) Urban Only	(2) Rural Only	(3) Male	(4) Female
Year[a]	0.219***	0.233***	0.120**	0.262**
	(0.0480)	(0.0307)	(0.0466)	(0.102)
Ability Controlled	-0.120	--	--	--
	(1.750)			
IV	2.849	--	--	--
	(1.721)			
Twin	-3.132***	--	--	--
	(1.100)			
Hourly Wage	0.348	-0.0885	1.660*	-0.349
	(0.779)	(0.121)	(0.815)	(1.703)
Occupation Dummies	-1.820***	-1.414***	-3.125***	-4.230***
	(0.577)	(0.195)	(0.625)	(0.791)
Industry Dummies	0.713	--	3.261***	1.346
	(0.528)		(0.911)	(1.274)
Selectivity Bias	6.766***	-0.153	--	--
	(2.388)	(0.185)		
Using CHIP data	-0.279	1.673***	-1.752**	-0.398
	(0.469)	(0.200)	(0.636)	(0.561)
Work Unit Dummy	-1.068**	-2.155***	-0.721	0.365
	(0.488)	(0.197)	(0.743)	(1.288)
Urban	--	--	1.895	3.848*
			(1.092)	(2.024)
Male	-0.609	0.599**	--	--
	(0.484)	(0.210)		
Female	0.615	1.008***	--	--
	(0.510)	(0.229)		
Migrant	--	--	-5.337***	-6.335***
			(0.833)	(1.383)
Constant	1.297	-0.680	0.811	-1.799
	(0.904)	(0.542)	(1.217)	(2.931)
Observations	308	53	48	48
R-squared	0.593	0.791	0.565	0.709

Note: The dependent variable is estimated return to education. a) Year=0 if year equals 1975. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the study level.

Table 6: Non-linear Pattern of Returns to Education over Time

	(1) 1975-1988	(2) 1989-1995	(3) 1996-2002	(4) 2003-2009	(5) 1996-2006
Year[a]	0.299***	0.236***	0.504***	-0.204	0.359***
	(0.0778)	(0.0893)	(0.153)	(0.200)	(0.0879)
Ability Controlled	2.826	0.721	-2.580**	--	-2.435**
	(1.945)	(1.314)	(1.251)		(1.189)
IV	3.230***	7.091***	-0.770	--	-0.622
	(0.936)	(1.302)	(1.271)		(1.208)
Twin	--	--	-3.644***	--	-3.059**
			(1.324)		(1.209)
Hourly Wage	--	-1.174*	-0.909	0.312	-0.967
		(0.661)	(0.713)	(1.231)	(0.596)
Occupation Dummies	-1.201*	-2.439***	-4.082***	-2.575**	-4.051***
	(0.602)	(0.483)	(0.626)	(1.231)	(0.542)
Industry Dummies	0.340	0.872	1.621**	--	1.696***
	(0.653)	(0.546)	(0.684)		(0.615)
Selectivity Bias	-3.016	-0.474	12.66***	--	12.65***
	(2.203)	(1.529)	(1.436)		(1.370)
Using CHIP data	-1.408**	0.593	1.140	--	1.365
	(0.627)	(0.555)	(1.051)		(0.984)
Work Unit Dummy	-0.651	-0.594	-1.534**	1.265	-1.491***
	(0.647)	(0.514)	(0.620)	(1.281)	(0.504)
Male	-0.740	-0.812	-0.0829	-0.127	0.176
	(0.804)	(0.578)	(0.883)	(1.629)	(0.756)
Female	0.752	1.127*	2.299**	0.283	2.318***
	(0.804)	(0.573)	(0.883)	(1.629)	(0.756)
Constant	0.920	1.051	-4.200	11.82*	-0.918
	(0.825)	(1.532)	(3.734)	(6.534)	(2.198)
Observations	54	129	96	27	114
R-squared	0.517	0.516	0.762	0.376	0.751

Note: The dependent variable is estimated return to education. a) Year=0 if year equals 1975. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the study level.

Appendix Table: Robustness Checks and Alternative Specifications

	(1) Bonus	(2) Subsidy	(3) In-kind Trans	(4) All Included	(5) No Weight	(6) No Cluster	(7) Work Unit
Year[a]	0.208***	0.210***	0.211***	0.209***	0.139	0.0652	0.208***
	(0.0446)	(0.0465)	(0.0443)	(0.0452)	(0.114)	(0.0527)	(0.0431)
$(Year)^2$					0.00211	0.00473***	
					(0.00273)	(0.00155)	
Bonus Included	0.251			0.393			
	(0.712)			(0.996)			
Subsidy Included		0.0464		-0.159			
		(0.612)		(0.902)			
In-kind Transfer Included			-0.0757	-0.0962			
			(0.570)	(0.645)			
SOE							-0.338
							(0.738)
TVE							-0.570
							(0.617)
Private							1.902**
							(0.709)
Constant	-0.734	-0.724	-0.730	-0.756	0.193	0.324	-0.653
	(0.708)	(0.723)	(0.710)	(0.738)	(1.262)	(0.587)	(0.798)
Observations	371	371	371	371	371	371	361
R-squared	0.560	0.559	0.560	0.561	0.557	0.571	0.575

Note: The dependent variable is estimated return to education. a) Year=0 if year equals 1975. * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at the study level. All regressions include dummy for selection bias, using CHIP data, male, female, urban, migrant, hourly wage, occupation dummies, IV and abilities controlled.