



LUND UNIVERSITY
School of Economics and Management

Master programme in International Economics with a Focus on China.

**The Returns to Education:
An Empirical Study of Urban China, 1988-2007**

Benjamin Faigen
gic11bfa@student.lu.se

Abstract: This paper uses data from a recently-released survey pertaining to individuals in urban locations in 2007 to estimate rates of return to education in China. In doing so, previous estimates in the empirical literature are updated by five years. The key issue under consideration is whether the private incentive to spend time and money on education has increased over the course of China's economic transition, given the increased permeation of market forces in determining wages and a policy focus on improving educational quality. The mincer-type rate of return to education is estimated to be 9.6 percent in 2007; a return greater than in previous time periods but comparatively low by international standards. In addition, the completion of university-schooling is found to be the most profitable out of all the educational attainment levels, whilst recently-completed education is of greatest value at the commencement stage of employment.

Key words: Returns to Education, Transition, Mincer, Labour Market, China.

EKHR71

Master thesis (15 credits ECTS)

June 2012

Supervisor: Anders Nilsson

Examiner: Christer Gunnarsson

Table of Contents

page number:

1. Introduction.....	5
2. Background discussion.....	8
2.1 Labour market reforms in China.....	8
2.2 Schooling reforms in China.....	12
3. Theoretical framework and previous research.....	14
4. Data Description.....	21
4.1 CHIP data.....	21
4.2 RUMiC data.....	22
4.3 Comparison between the samples.....	23
5. Estimating the returns to education.....	24
5.1 Model specifications.....	24
5.2 Descriptive statistics.....	28
6. Empirical Results.....	29
6.1 The returns to education in China, 1988-2007.....	30
6.2 The returns to education in context.....	31
6.2.1. A comparison with other transition countries.....	31
6.2.2. A broader international comparison.....	33
6.3 The returns to education in China by attainment level, 1988-2007.....	35
6.4 The returns to productive and unproductive worker characteristics, 1988-2007.....	36
6.5 The vintage effects of education in China, 1988-2007.....	38
7. Conclusion.....	40
8. Appendices.....	43
Appendix A: Complete regression results, models 1-3.....	43
Appendix B: Complete regression results, models 4-5.....	44
Appendix C: Calculations: returns to specific educational levels, 2007.....	45
Appendix D: Partial derivative calculations: maximum years of experience.....	46
Appendix E: Correlation matrices.....	47
9. Reference list.....	48

List of Tables*page number:*

Table 1 Variable means for workers in China, 1988-2007.....	29
Table 2 The co-efficient on years of schooling, 1988-2007.....	30
Table 3 Returns to education in a selection of transition countries, 2002.....	32
Table 4 The co-efficient on schooling levels, 1988-2007.....	35
Table 5 The co-efficient on years of experience and experience-squared, 1988-2007.....	37
Table 6 The co-efficient on non-productive characteristics, 1988-2007.....	38
Table 7 The co-efficient on the interacted education-experience term, 1988-2007.....	38
Table 8 Wage premiums by educational level, 2007.....	45

List of Figures*page number:*

Figure 1 Number of employed persons at year-end in urban areas by registration status.....	10
Figure 2 Number of employed persons at year-end by three strata of industry.....	11
Figure 3 The co-efficient on years of schooling, regional averages of rate of return.....	33
Figure 4 The co-efficient on years of schooling, classification by income category.....	34

List of Abbreviations

ANU	Australian National University
AusAID	The Australian Agency for International Development
CASS	Chinese Academy of Social Sciences
CEER	Central and Eastern European countries and Russia
CHIP	Chinese Household Income Project
FDI	Foreign Direct Investment
FIE	Foreign-invested Enterprise
HRS	Household Registration System
ICPSR	Inter-University Consortium for Political and Social Research
IT	Information Technology
IZA	Institute for the Study of Labour
NBS	National Bureau of Statistics
OLS	Ordinary Least Squares
RUMiC	Rural-Urban Migration in China
SEZ	Special Economic Zone
SOE	State-Owned Enterprise
WTO	World Trade Organization

1. Introduction

An individual's decision to defer participation in the workplace and acquire full-time formal education involves an opportunity cost: tuition fees that could be alternatively utilized, together with the postponement of earnings represent financial obstacles to completing further education, whilst the time and energy required to engage in study requires a substantial commitment that may take an emotional toll. By measuring the private rate of return to an additional year of education, economists are able to make inferences regarding the profitability of gaining increased educational credentials and by extension, a given individual's incentive to invest in schooling.

Considering that the theory regarding the accumulation of schooling as a productivity-enhancing wage determinant was conceived and originally tested on a labour market assumed to have few imperfections such as the United States (Becker, 1964; Mincer, 1974; Liu, 1998; Harmon, Oosterbeek and Walker, 2003), empirical tests on the returns to education in a labour market that has undergone significant transformation in recent decades, such as China's, can shed light on how the incentives to invest in education may differ to those faced by individuals elsewhere (Byron and Manaloto, 1990). As expressed by Liu, (2010, p.374),

The adoption of institutions in which the ability to learn is highly rewarded is crucial in order for a society to fully realise the contribution of education or human capital to economic growth and development.

By implication, a maturing, increasingly competitive labour market can facilitate a more accurate setting of wages, but policymakers also have a role to play to ensure the educational system equips learners with skills that can be put to use. This takes on added importance in a Chinese context, given that a significant number of educational institutions were not in operation and the usefulness of schooling was at a dramatically low point, prior to the commencement of market reforms.

The returns to education have been estimated for a host of countries worldwide by Economists since the 1950s (Psacharopoulos, 1994). Estimates pertaining to China have been considerably facilitated by the availability of three waves of data from an interview-based survey in urban locations for the years 1988, 1995 and 2002, as part of the Chinese Household Income Project (CHIP), an internationally-coordinated research effort (Zhang and Zhao, 2007, p.250).

Given a common pre-reform legacy of income-levelling wages, centrally-allocated human resources and systematic, politically-oriented education in China, the Soviet Union and its satellites, comparisons between the returns to education in China with those in other countries at equivalent stages of economic transition is one method of illuminating the progress the country has made in rewarding the nation's most productive workers (Fleisher, Sabirianova and Wang, 2005; Zhao and Zhou, 2007, p.225; Zhang and Yang, 2010, p.4). In 1988, approximately one decade into the economic reform period¹, estimates of the returns to education in China are comparatively lower than the rates of return estimated in the early-reform period of a selection of Eastern European transition countries, including Hungary, Poland and the Czech Republic² (Meng and Kidd, 1997; Liu, 1998; Maurer-Fazio, 1999; Fleisher, Sabirianova and Wang, 2005; Hung, 2008). Given that economic reforms in Eastern Europe and the Soviet Union began at least eleven years after China, more recently estimated schooling returns may alternatively be compared with the documented returns for a broader set of nations. Indeed, empirical estimates of Chinese schooling returns from both 1995 and 2002 are found to be lower than the average returns for both the wider-Asia region and the world (Psacharopoulos, 1994; Psacharopoulos and Patrinos, 2004; Appleton, Song and Xia, 2005, Yang, 2005), suggesting that education is relatively under-rewarded in China.

This paper makes a number of contributions to the empirical literature. Access to a newly-available urban household survey conducted in 2007 provides an opportunity to update the empirical estimates of the returns to education in China. As a result, a thorough assessment of how education has been rewarded over an extended time period can be undertaken with a distinction made between the value of recently-completed education and the value of education of an older vintage. In addition, since the empirical literature tends to emphasise labour market developments exclusively in the discussion of wage determination, this paper expands the discussion by acknowledging the concurrent changes that have occurred within the Chinese educational system throughout the reform period, so as to underscore the link between schooling and economic advancement.

¹ Fleisher, Sabirianova and Wang (2005) credit 1979 as the starting point of the general Chinese economic reform period. The exact starting date of reforms is open to interpretation, however. Naughton (2007, p.85) claims that "China launched economic reforms at the end of 1978", whilst Appleton, Song and Xia (2005) claim that urban reforms, of interest in this paper, did not actually begin until 1983. Maurer-Fazio (1999) asserts that urban enterprises were not significantly influenced by industrial reform until 1984.

² Poland and Hungary were the first of the Eastern European countries to commence their reform programmes, in 1990 (Fleisher, Sabirianova and Wang, 2005), with the Czech Republic commencing economic reform in 1991. See table 3 for a complete listing of reform starting points. The early-reform period refers to the first five years after the dismantling of the planned economic system.

The first specific question addressed in this paper can be expressed as follows: How have the returns to education evolved over a 19 year period? By asking this question, the intention is to clarify the private incentive to invest in education in China, using the return on educational investment as an answer. The second specific question addressed in this paper asks how does the most recent return to education in China, estimated for 2007, compare globally? Access to new data permits a comparison to the most recent international results, as reported in the empirical literature. Unless the results are put into some perspective, they are of little value. The third specific question addressed in this paper can be expressed as follows: Which specific educational attainment level is the most profitable? In addition to treating the returns to education as a constant, whereby no distinction is made between attainment levels, it is of interest to illuminate the results in question one by looking at the labour market value of particular levels of schooling. Since questions two and three are included to shed light on the results obtained for question one, they do not require formally expressed hypotheses in the theoretical framework. The final question addressed in this paper, concerns the relative importance of education versus experience in the Chinese labour market. If education becomes more valuable over time, due to quality improvements for instance, than it can effectively substitute for experience in wage determination. Specifically, it is asked: Are the returns to newly-completed education greater than education completed in the distant past?

From the outset, it must be noted that this paper is focused on quantifying the value of education in the Chinese labour market for individuals, rather than examining the determinants of the demand for education or the value of education for national growth and development, which might be better addressed in alternate papers. The fact that the utilised data is restricted to urban locations, also limits the ability of the obtained results to be generalised. A significant proportion of the Chinese population is thus excluded.

The paper is organised as follows. Section two comprises a background discussion, split into two parts. The first part discusses reform-era developments within the Chinese labour market, pertaining to the rewarding of education, whilst the second part discusses developments within the Chinese education system, pertaining to the imparting of skills and knowledge that can be put to use. Section three comprises a theoretical framework for analysing the returns to education, together with a literature review. Section four describes the dataset. Section five specifies the relevant variables and testing strategy required to answer the research questions. Section six contains the empirical results and section seven concludes.

2. Background discussion

2.1. Labour market reforms in China

In China's command economy, workers were allocated to employers by government labour bureaus. Job seniority, rather than educational credentials was the most important wage determinant, with estimates of the returns to schooling being close to zero by the end of the planned period (Fleisher and Wang, 2005; Naughton, 2007, p.192; Qiu and Hudson, 2010).

Economic reforms began with the gradual de-collectivisation of agricultural land and the granting of permission to trade land-use rights in rural areas. In 1979, a select number of State-owned enterprises (SOEs) in urban China were permitted to trade small quantities of inputs and outputs in free markets, in addition to being able to keep a small fraction of their profits for the first time. In 1980, labour bureaus had also begun to allow enterprises to make hiring decisions themselves, signalling the early formation of a market for labour (Qiu and Hudson, 2010). The amount of profit permitted to be retained within SOEs increased gradually at the beginning of the 1980s, accompanying greater decision-making autonomy in the hands of managers with regard to output. The increased autonomy being experienced by enterprise managers resulted in the awarding of bonus payments to the most productive workers (Groves, Hong, McMillan and Naughton, 1994). This was in stark contrast to the pre-reform period and had the effect of incentivising workers to exert greater effort than previously. In fact, increased profit retention led to a rise in real average wages for employees in the manufacturing, textiles and machinery, and electronics sectors. The negative side of this, from a firm efficiency perspective, was that wages tended to rise above productivity. Nevertheless, formal schooling continued to be under-valued relative to seniority and the most capable workers remained under-utilised in the early reform period (Groves, Hong, McMillan and Naughton, 1994; Yang, 2010, p.329).

The implementation of a labour contract system in 1986, without a guarantee of renewal, can be viewed as the first attempt to discard the benefit of lifetime employment that was historically provided by the state sector. Upon its inception, this institutional change tended to apply to new recruits rather than established workers. With the passing of the 1994 labour law, the number of workers employed on a contract basis began to increase significantly, however (Groves, Hong, McMillan and Naughton, 1994). The shift in nature of the employment opportunities being provided, from permanent to fixed term, can be interpreted as a means of incentivising the most useful workplace contributors. Those individuals with

relevant, recently obtained skills and knowledge were conceivably in a better position to prove their worth than in the early-reform period, under the belief that their contracts might not be renewed. Indeed, a climate of state sector retrenchment and job insecurity became a reality in the late 1990s, illustrated in figure 1 by the distinct downturn in the employment opportunities being provided by SOEs after 1997. Observing the chart, by 2005, some 48 million jobs had been cut. The accumulation of work experience, although historically a substitute for schooling, could no longer safeguard workers from retrenchment.

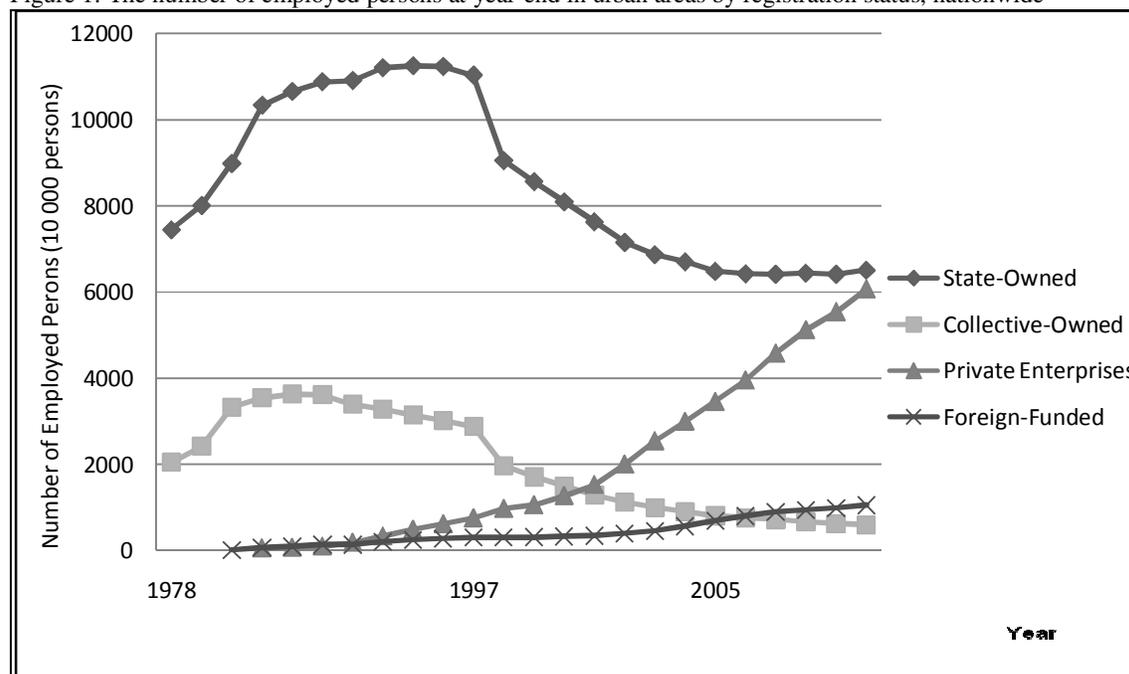
By the time state sector restructuring had commenced, the burgeoning private sector was in a position to absorb a considerable amount of surplus labour. The pre-existing social stigma regarding non-state employment had evaporated by this time, with labour supply beginning to operate more in line with labour demand. Indeed, the growing trend in employment within the private sector is clearly evident at the end of the 1990s in figure 1. Whilst the state sector had comprised 61 percent of urban employment in 1990, this sector comprised only 32 percent of urban employment by 2001 (Qiu and Hudson, 2010).

A discussion of ownership diversification should also be placed within the context of a Chinese economy increasingly engaged with the world through investment in the 1990s and up to the present day, given that additional non-state employment opportunities emerged within Foreign-invested Enterprises (FIEs). An FIE refers to the establishment of business operations in China by foreigners through means such as joint ventures or wholly-owned subsidiaries (Zhang, Zhang and Zhao, 2001). At the outset of the economic reform period, Foreign Direct Investment (FDI) was only permitted in selected Special Economic Zones (SEZs). With 1988's Open Door Policy, FDI began to spread beyond designated SEZs, and this trend was consolidated with Deng Xiaoping's 'Southern Tour' in 1992, which imbued foreign investors with confidence in China's commitment to economic liberalisation. Foreign investment increased again after China's accession to the World Trade Organisation (WTO) at the end of 2001. For instance, the number of FIEs approved to operate in the country increased by 6.3 percent between 2003 and 2004. At the beginning of 2005, a total of 512,504 FIEs had received approval to operate in China (Du and Girma, 2007; Naughton, 2007, p.403). In terms of the connection between FDI and the labour market, employment opportunities within FIEs tended to be for those individuals with post-secondary educational qualifications (Hannum and Park, 2007, p.17; Qiu and Hudson, 2010). Although comparatively smaller in terms of the number of individuals employed,

FIEs can nevertheless be expected to have competed for labour, bidding up the premium paid for productive skills in the process.

In addition to changes in the structure of ownership, the distribution of employment among different sectors of production in China has evolved over time, and must be considered as a potential factor in the labour market being able to better reward the most qualified workers. For instance, a change in emphasis from primary production towards services is likely to better reward those who have made the sacrifice to acquire skills and knowledge (Appleton, Song and Xia, 2005). As figure 2 demonstrates, employment opportunities within the tertiary sector have steadily increased since the commencement of the economic reform period, with a corresponding increase in demand for mental labour, as opposed to manual labour (Blaug, 1972; Pepper, 1990; p.2).

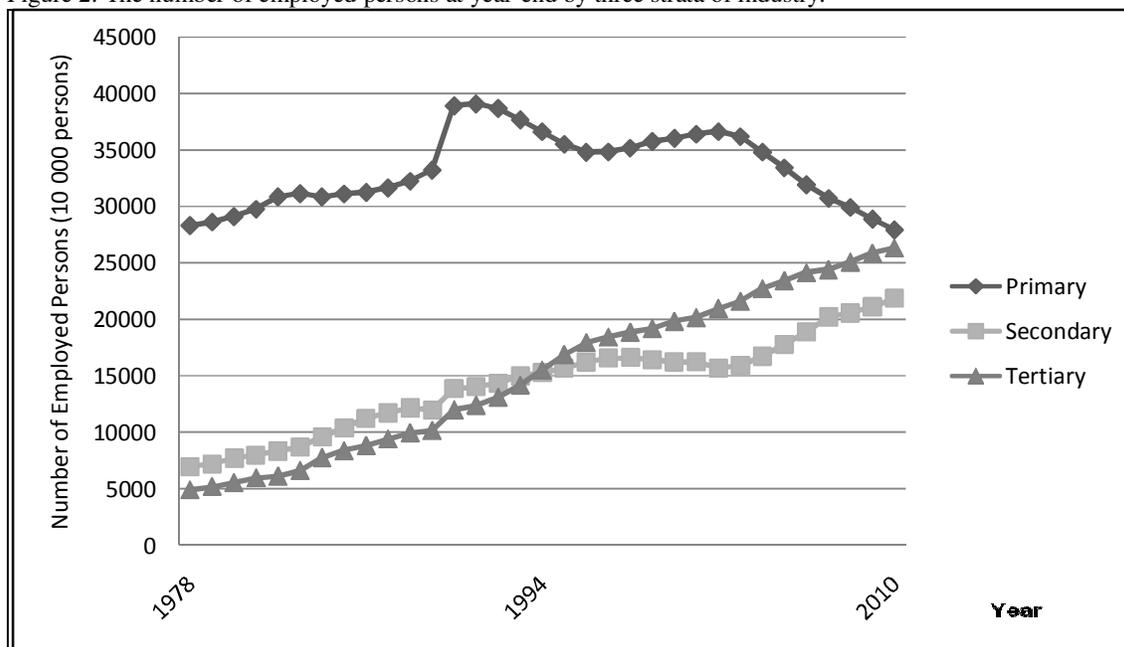
Figure 1: The number of employed persons at year-end in urban areas by registration status, nationwide³



Source: China Statistical Yearbook, 2011

³ Employment trends provided by the major sectors of ownership are illustrated. For analytical purposes, collective enterprises are considered to be part of the non-state sector (Liu, 1998).

Figure 2: The number of employed persons at year-end by three strata of industry.



Source: China Statistical Yearbook, 2011.

A change in the composition of the supply of labour in urban areas, approximately one decade into the transition process, is also worth commenting upon. Until the mid-1980s, rural-to-urban migration was tightly controlled through a Household Registration System (HRS). The HRS effectively segregated urban and rural labour markets since employment in urban locations was contingent on the possession of urban registration. In 1988, however, rural migrants were permitted to work on a temporary basis in urban areas. From this point onwards, the demand for rural labour increased, a result of the commencement of private sector growth (Ge and Yang, 2011).

In terms of the demand for specific levels of educational attainment, the Chinese labour market would appear to have entered a recent state of disequilibrium. The supply of graduates with Bachelor's level qualifications has begun to outpace demand, signalling a high degree of competition for entry-level positions. Only post-secondary technical school graduates, comprising roughly 43 percent of all post-secondary graduates in 2004, could be said to possess skills that are in demand. In 2005, the employment rate for technical school graduates was 95.4 percent (Dongping, 2009, p.6). In contrast, the employment rate of college graduates declined over the time period between 1966 and 2006, from 93.7 percent to 70 percent (Yongpo, 2009, p.164, 170).

In sum, the labour market has witnessed significant transformation since the commencement of economic reforms. A change in the composition of ownership with the potential for increased job mobility and the removal of lifelong employment guarantees are signs of a maturing labour market that is better able to reward the most productive workers. The current obstacle for policymakers to contend with is an over-supply of labour relative to demand, which has the potential to depress worker remuneration.

2.2. Schooling reforms in China

Any discussion of changes to the Chinese educational system and the role it has played within a rapidly modernising labour market needs to be placed within the context of the prevailing conditions at the outset of the reform period. To be sure, although China has historically claimed to prize education and to have valued its contribution to society since at least the founding of the People's Republic in 1949 (State Education Commission, p.1, 1997), the Cultural Revolution of 1966-1976 left the Chinese educational system in a state of disrepair. The systematic devaluation of educational credentials in Chinese society saw reduced linkages between education and occupational achievement. The centrally-administered University entrance exams were disbanded, with social status becoming the key to gaining tertiary admission. Educational institutions were closed down and those that remained in operation lacked sufficient technical equipment and materials, whilst academic standards had slipped dramatically (Hannum and Park, 2007, p.2; Borisenkov 2010, p.1; Liu 2010, p.374).

If one posits that the role of a nation's education system is to equip students with skills that can be put to use, the immediate period prior to economic reform had undermined the effectiveness of the Chinese education system, risking complete irrelevancy. As described by Borisenkov (2010, p.1,2),

After the end of the Proletarian Cultural Revolution in 1976, China had to first overcome the consequent chaos and then turn its attention to regulate its educational system by resuming the operation of educational institutions and recommencing the entrance exams at the tertiary level and finally regaining the lost prestige of education and the public respect for intellectuals, academics and teachers. Deng Xiaoping stressed new principles for the development of education and asserted its priority status within the general reform strategy.

By implication, the underlying notion behind reforming the Chinese educational system was to equip students with capabilities suitable for a market economy. Practically, this involved a decentralisation of educational governance, an increased number of tertiary institutions that

could enjoy greater autonomy, as well as permitting the provision of education outside the public sector. These directives were formalised in a “Decision on the Structural Reform of China’s Education System” in 1985. In addition, given the existence of prevailing low levels of population literacy, a policy of phasing in nine years of compulsory education, up to and including junior middle school, was advocated (Della-Iacovo, 2009; Borisenkov, 2010, p.1; Zang and Yang, 2010, p.3; Zhourakovskiy, 2010, p.44; Hu, 2010, p.47).

By re-attaching a sense of value to educational attainment and targeting a minimum level of schooling, the commencement of educational reforms can be viewed as the Chinese leadership having attempted to raise the skill level of its labour force and hence its usefulness. Nevertheless, approximately one decade into the economic reform period, the labour market still did not sufficiently reward higher educational credentials and this, in turn, lowered the incentive to invest in education. An increased dropout rate of students at lower educational levels and reduced enrolment numbers at secondary level were in evidence throughout the time period leading up to 1988 (Pepper, 1990, p.125). This trend was halted, however, with the increasing diversification of enterprise ownership in the labour market and the accompanying potential for increased rewards for educational qualifications.

Official recognition of the need to improve the quality of educational institutions was noticeable in the changed direction of government policy in the mid-1990s, notably the “Outline for Reform and Development of Education in China”. Given that educational practices within lower levels of Chinese schools in particular were still under the influence of the former USSR and were unsuitable for the requirements of a market economy, curriculum reform had to emphasise creative ability, autonomous thinking, practical skills and innovative ability, being crucial for students to contribute to a changing economic environment. Reforms to the content and delivery of education also had to place the student at the centre of the learning process, in complete contrast to the established methods of learning in the country (Mok, 2006, p.30; Della-Iacovo, 2009; Zhong and Li, 2010, p.38).

Whilst improving educational quality is realistically a long-term project with strict enforcement requirements, the attainment of education conveys the possession of at least a minimum amount of competencies to potential employers. Educational credentials can thus be seen as a potential source of adaptability in a transformative labour market. Indeed, by the end of the 1990s, education was having a larger influence on the labour market outcomes of workers than it had previously. Analysis of a survey of urban workers between 1999 and 2000 reveals that workers with higher education levels were less likely to be made redundant and

more likely to find new employment, despite a climate of rising unemployment (Maurer-Fazio, 2007, p.272, 273).

The recently observed shift in student enrolment away from the selection of traditionally specialised university degrees such as engineering towards social science degrees (Zhourakovskiy, 2010, p.44) can be seen as a reflection of students arming themselves with a broader skill-set, and as a result, having the potential for greater occupational mobility. The fact that university enrolment numbers have increased dramatically overall, from 966,000 in 1996 to 5.46 million in 2006 (Yongpo, 2009, p.163), can also be interpreted as a sign that students perceive value in the possession of increased educational credentials. Nevertheless, higher education expansion creates challenges. A rise in the number of enrolled students can lead to a decline in quality when resources are stretched (Hu, 2010, p.49). Whilst science and technical graduates in particular may possess a certain level of skills and training, their capabilities remain limited by developed-country standards (Naughton, 2007, p.362). Indeed, foreign company executives, surveyed in 2005, claimed that only 10 percent of Chinese applicants were suitable for employment, due to the low quality of education obtained and a focus on theory instead of practical skills (Della-Iacovo, 2009). Recent government education policy has targeted the improvement of higher education, specifying quality audits as a means to bring Chinese universities in line with those in the West (Della-Iacovo, 2009, p.30).

In sum, a significant overhaul of the Chinese educational system was needed after the Cultural Revolution in order to equip students with skills that are of value in a dynamic market economy. Whilst educational quality has been at the forefront of government policy since the mid-1990s, quality improvements in line with international standards is an on-going process against a background of rising enrolment.

3. Theoretical framework and previous research

The productive contribution of labour to final output cannot always be observed. Remuneration based on the number of hours devoted to a task, for instance, could obscure the usefulness of the effort exerted. An alternative approach is to examine the impact on the income of workers caused by the personal attributes which one expects to influence the speed and efficiency of production (Naughton, 2007, p.192). If an investment in human capital is assumed to result in the imparting of skills and knowledge (Schultz, 1961), education can be

viewed as a personal attribute of significance, given that skills and knowledge ultimately determine an individuals' capabilities in the workplace.

From a theoretical perspective, Blaug (1972) explores the conditions necessary for an effective analysis of the impact of education on productivity. He notes that education makes the marginal worker more productive only if he has access to complementary inputs, such as capital and entrepreneurship. The author also posits that the marginal product of mental labour is greater than manual labour only if the market for labour exhibits sufficient levels of competition so that labour can be both recruited and utilised efficiently.

The channels through which education affects productivity are specified by Rosenzweig (1995). The author posits that a strong educational background can impact the speed with which individuals can process information on the job related to a production process or a task which needs to be carried out. Secondly, the author suggests that the more educated receive information prior to commencing work that allows for a better understanding of how to use technology, prior to actually using it, than the less-educated. In other words, schooling can be useful at the commencement stage of work.

If schooling can impact productivity, those individuals with the ability to contribute meaningfully to production can expect to be rewarded in the form of higher earnings (Becker, 1964, p.1). Blaug (1972) contributes to this argument by claiming that employer expectations of employee capabilities drive pay increases. He claims that employers will pay those with education higher wages, regardless of the extent to which the acquired schooling is skill-oriented, since employers believe that the educated have the inherent capacity to solve problems, work independently, take initiative and adapt to changing circumstances.

The relationship between schooling and earnings can also be analysed from a different perspective, namely the motivation behind the initial decision to undertake investment in education. In his analysis of this investment decision, Mincer (1974, p.7) highlights the trade-off that deferred earnings presents to an individual, noting that investment in education will only occur if deferred income increases. Similarly, Becker (1964, p.37) notes that the amount of funds allocated to human capital investment is influenced by the profitability of the investment, or its rate of return. Rosenzweig (1995) views sufficiently large earnings upon graduation as compensation for the costs of undertaking study. Nevertheless, one must assume that for most individuals, certain knowledge of future earnings capacity is unlikely.

Instead, speculation is required, given some initial knowledge of the conditions within a chosen market.

In studying the effects of schooling on earnings in China, estimates of the private rate of return need to be placed within the context of an economy undergoing a process of economic transition. The return to education in 2007, for example, almost thirty years after the commencement of economic reforms, is expected to be higher than at an earlier reform stage since a maturing economy and the increased influence of market forces in determining wages should better reward productivity. For this theory to hold, a belief in the market mechanism as an optimal allocator of scarce resources is necessary. In his discussion of economic transition, Nee (1989, p.678) writes:

A fundamental change in the processes of socio-economic attainment occurs in the transition from redistribution to markets, involving not only a reduction in the relative transfers of surplus from producers to redistributors but changes in opportunity structures and incentives resulting from market reforms.

By implication, wage compression is a common feature in a centrally planned economic system, as the State is the sole allocator of resources and acts to equalise income among individuals. Education is therefore assigned a low economic value in order to prevent wage dispersion (Campos and Jolliffe, 2003). The undertaking of economic transition can be expected to correct previous wage compression and value productive characteristics more appropriately, given the in-built incentive structure inherent in the market mechanism (Maurer-Fazio, 1999). An alternative theory regarding the return to education during economic transition suggests that the skills imparted by educational institutions within a command economy were overly-specialised and intended for use on technology which would later become out-dated. If this particular theory holds, then education acquired in the pre-reform period should exhibit declining returns at the beginning of the transition period (World Bank, 2003).

A comparison between the returns to education in post-1978 China and in the pre-reform period, as documented in the empirical literature, supports the conjecture that education was under-valued in the command economy period. Zhou (2000) uses panel data covering the time period 1965-1994 on 4730 urban residents and finds that the premium to college education compared to elementary education rose from 11 percent in the pre-reform period to 23 percent in the reform era. Similarly, the high school premium rose from 8 percent to 17 percent. Fleisher and Wang (2005) document almost non-existent returns to education during the Cultural Revolution, noting that it was not until the mid-1990s that the rate of return

recovered significantly. Nevertheless, the authors find that college education was important in obtaining a managerial position in government and industry during the pre-reform period.

In a significant amount of the empirical literature, comparisons of reform-era returns to education are made in isolation from pre-reform returns. Meng and Kidd (1997) take 1981 as a starting estimation point and report a return of 2.5 percent, with data coming from a worker-survey of 25,000 men in the State-owned sector. In 1987, the authors report a slight increase to 2.7 percent. Byron and Manaloto (1990) survey workers in the city of Nanjing in 1986 and find a return of 3.4 percent. The authors claim that the sample represents the well-educated Chinese, given the relatively high number of employment opportunities in the city and the restrictions imposed on relocation from rural areas at the time.

The availability of a comprehensive and rigorously sampled dataset, the CHIP in 1988 (refer to section 4.1 for a complete discussion of the data), provided the impetus for a surge in academic research into the returns to education in China, one decade into the reform period. Xie and Hannum (1996) estimate a return of 3.1 percent, hypothesising that discrepancies in the pace of economic reforms stunt the comprehensive rewarding of productive characteristics across regions. The authors refute Nee's transition theory on the grounds that high rates of city growth are correlated with low rates of returns to education, but note the absence of a market for labour ten years into the reform period. Using the same dataset, Johnson and Chow (1997) estimate a return to education of 3.3 percent, but caution against the exclusion of secondary sources of income as a source of under-estimation. Maurer-Fazio (1999) calculates returns according to gender, reporting rates of 2.9 and 4.5 percent for males and females, respectively. Liu (1998) estimates the returns to education according to levels of attainment, rather than as a continuous variable, and finds the prevailing wage for individuals with university qualifications to be 37.5 percent higher than for those without education at all in 1988.

The arrival of a second-wave of CHIP data in 1995 facilitated the comparison of returns to education over a seven year period and provided some evidence in support of rising returns, in line with Nee's transition theory. Gustafsson and Li (2000), estimating the returns to education by attainment level and gender, find that the returns to college education relative to upper-middle school education rose from 8.9 percent and 10.2 percent for males and females in 1988, to 15.5 percent and 20.8 percent in 1995. Knight and Song (2003) find a similar increase in the premium to college education over the same time period, but do not differentiate their estimates by gender. Estimating the returns to education as a continuous

variable, Li (2003) reports returns in 1995 of 5.4 percent for males and 6.9 percent for females, which are larger than the empirical estimates from the first wave of CHIP data. Using hourly, instead of the annual wage data common to the other studies, he also contends that annual wages are relatively under-estimated. Applying alternative estimating techniques to the 1995 CHIP data, Li and Luo (2004) find that the use of IV estimation produces larger results than ordinary least squares (OLS). Yang (2005) uses both the 1988 and 1995 CHIP datasets to estimate returns to education at the city level, reporting widening dispersion over the time period, from 3.1 to 5.1 percent on average.

The arrival of a third-wave of CHIP data in 2002 allowed for estimates of the returns to education to be further updated. Appleton, Song and Xia (2005) examine wage determinants over the fourteen year period with which the CHIP data is available. A rising coefficient on the schooling variable, from 3.6 percent to 7.5 percent is the foundation for the authors' conclusion that the Chinese labour market is becoming more competitive, with remuneration increasingly more responsive to productivity over the time period. Similarly, use of the CHIP data by Fleisher, Li, Li and Wang (2005) produces estimates of consistent increases in schooling returns over the time period 1988-2002. Alternative data sources used over the same time period, such as the 14 years of consecutive household surveys utilized by Zhang, Zhao, Park and Song (2005) produce the same positive earnings trend. Although Qiu and Hudson (2010) estimate lower returns in 1993 compared with 1988, they report rising returns thereafter. Returns to education are also estimated based on a city's location in proximity to both Shanghai and Beijing, with the results suggesting that earnings are lower for individuals the further they are located from these two cities. More recent data, obtained from China's Institute of Labour Studies in 2005, produces a rate of return of 12.1 percent, much higher than the rates of return reported by existing studies covering urban China from the late 1980s until 2002 (Qian and Smyth, 2008).

The empirical literature also contains estimates of the returns to education for other countries undertaking the economic transition process. Campos and Jolliffe (2003) used five data cross-sections to estimate returns in Hungary from 1986, during state socialism, to 1998 when market forces had permeated the economy. The authors find increasing returns from 6.4 percent in 1986 to 11.2 percent in 1998. Fleisher, Sabirianova and Wang (2005) use metadata from 39 studies of 11 Central and Eastern European countries over the period 1975-2002. The authors hypothesise that the faster the speed of reforms, the more rapidly the returns to schooling should adjust to market rates, and find results to support this theory.

Hung (2008) estimates the returns to schooling using metadata from Bulgaria, the Czech Republic, Romania, Russia, the Slovak Republic and Romania between 1985 and 2001. The author reports increasing returns to education in the early-reform period, with the most rapid increases occurring in those countries which exhibited low returns prior to transition such as Romania and Bulgaria. The author also remarks that it took one decade for the six transition countries to achieve returns of 10 percent, which is marginally above the world average in schooling returns and 1 percent below the average for low and middle income countries (Psacharopoulos, 1994). In the case of Croatia, Vujčić and Šošić (2009) report an initially delayed adjustment of wages to those of other transition countries, with returns finally catching up in 2004 as educational credentials, particularly higher education, increased in importance further into the transition period.

Given data on China over a 19 year period and based on the preceding discussion, the first hypothesis of this paper is formally expressed below:

Hypothesis 1: Education becomes more valuable as economic transition progresses.

An investment in schooling should be considered analogously to an investment in tangible physical capital. Since physical capital is subject to depreciation, however, human capital must also incur some loss of value. In a basic earnings model, the net investment in education can be considered to be non-negative over an employment lifetime (Mincer, 1974, p.8). Although the theoretical discussion in this paper has so far centred on productivity-augmenting skills, with the implication that future income will rise infinitely as a result, this is an over-simplification. As expressed by Mincer (1974, p.8),

The finiteness of life, the increasing incidence of illness at older ages, and the secular progress of knowledge, which makes older education and skill vintages obsolescent, are compelling facts suggesting that as age advances, effects of depreciation eventually begin to outstrip gross investment.

By implication, skill obsolescence can lower the value of education obtained in the past. For instance, new technological developments can lead to an updating of existing knowledge (Rosen, 1975). This is especially the case when FDI is concerned, since investment from abroad involves the transfer of new skills, technology and ideas related to the production process. The associated expectation being that skill requirements of employees must increase in order to harness frontier information (Naughton, 2007, p.145). Therefore, education can be seen in a positive light, being a useful adjustment tool when technological advancement leads to shifts in the macroeconomic environment away from equilibrium (Schultz, 1975).

In the context of economic transition, the ability to adjust to changes in the economic environment can vary according to age (Campos and Jolliffe, 2003). The implication being that the youngest members of the workforce, and by association, those with the most recently obtained education, possess the skills and knowledge to adapt to changing employment requirements. A necessary assumption here is the ability of the education system to update curricula to mirror an economic transformation. If this assumption holds, newer education is expected to be more relevant to current production than older education.

Earnings outcomes for education of an older vintage can be examined for specific attainment levels. In a study of the Information Technology (IT) sector in Israel in 1983, Neumann and Weiss (1995) theorise that there is greater potential for skills obsolescence at higher levels of education, since advanced knowledge, particularly when applied to industries at the forefront of new technology, is likely to be updated more regularly. The skills acquired at the elementary school level, on the other hand, are expected not to vary as significantly over time.

Empirical research on the vintage effects of education in a Chinese context has been limited in terms of estimation date and geographical coverage. Byron and Manaloto (1990) interact education and experience and obtain a positive co-efficient for the city of Nanjing in 1986, suggesting that newly obtained education is not necessarily more valuable than education obtained in the past. Liu (1998), on the other hand, focuses on Guangdong province and reports that older workers had lower returns to education than younger workers in 1988. A similar result is obtained by Qian and Smyth (2008). The authors find that those workers 35 years and under in the provinces of Hunan, Zhejiang and Heilongjiang, as well as the city of Tianjin who entered the labour force after economic reforms were already underway had higher returns to education than those who received schooling in the pre-reform era. Qiu and Hudson (2010), in a more comprehensive study of urban locations between 1989 and 2000, find that the returns to education decline, the longer the length of time since an individual has left school, reinforcing the theory that the value of skills deteriorate over time. In a non-Chinese context, Hong (2008) finds that workers in Romania and Russia who graduated early in the transition process had higher wage premiums compared to those workers who graduated prior to the commencement of transition.

In light of the preceding discussion, the second hypothesis of this paper is expressed below:

Hypothesis 2: Newly-completed education has greater labour market value than education completed in the past.

4. Data description

4.1. CHIP data

Three waves of a micro-level dataset, collected as part of the Chinese Household Income Project (CHIP) to analyse the distribution of income in China, are used in this paper to estimate the returns to education for urban individuals (Griffin and Zhao, 1988, Riskin, Zhao and Shi, 1995; Shi, 2002). The surveys were designed by international researchers and scholars at the Chinese Academy of Social Sciences (CASS), with the final data obtained from the Inter-University Consortium for Political and Social Research (ICPSR)⁴. Sub-samples in the CHIP are drawn from the annual national household income survey of the National Bureau of Statistics (NBS). The sub-samples cover 10 out of 31 Chinese provinces in 1988, 11 in 1995 and 12 in 2002⁵. In 1988, 31,827 individuals are included in the urban sample. By comparison, the sample sizes are 21,698 and 20,439 in 1995 and 2002, respectively.

The CHIP surveys only include individuals registered in urban areas (*hukou*). As a result, rural-urban migrants are excluded, since they are unable to obtain hukou status. Nevertheless, this exclusion is not expected to bias the estimated wage equations from the sample of urban residents since consistently applied administrative controls limit the chances of migrants obtaining urban registration (Appleton, Song and Xia, 2005). Although the included provinces are not chosen at random, the cities within each province vary by size and level of economic development (Liu, 1998; Hauser and Xie, 2005).

The data contain detailed information in regards to the numerous sources of income received by individuals. In addition to the basic wage, income received in the form of bonuses, subsidies, hardship allowances, coupons and income in-kind are reported. The survey authors take monthly income amounts and multiply them by 12 to provide annual figures. However, the value of work-unit supplied housing is not recorded. This is a notable absence when the majority of individuals in the three surveys are employed within the State sector, where housing is commonly provided (Maurer-Fazio, 1999). It must also be acknowledged that since respondents to the surveys are asked to recall earnings information, the potential for

⁴ ICPSR is a unit within the Institute for Social Research at the University of Michigan

⁵ Provinces in the 1988 sample: Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Henan, Hubei, Guangdong, Yunnan and Gansu. The 1995 sample adds Sichuan province to this list, with the 2002 sample further adding Chongqing province.

the recording of inaccurate data exists. Individuals may not respond completely honestly or may not be able to remember exact earnings from the previous year.

The returns to education over an extended time period would most accurately be estimated with the use of panel data. The CHIP datasets are cross-sectional, however, providing a snapshot of the earnings potential of urban workers in three distinct years. The same individuals can therefore not be tracked over time, whilst those entering retirement in one survey will not enter into the sample for the next survey (Hauser and Xie, 2005).

4.2. RUMiC data

The Rural-Urban Migration in China (RUMiC)⁶ longitudinal survey comprises three distinct samples based on location (urban and rural locations) and ethnicity (a non-Han migrant group) for the time period 2007-2012. The survey covers the education and training backgrounds of adult household members, as well as respective members' employment situation, family, social relationships, life events, personal networks, income, expenditure and housing. The survey was put together by a team of international researchers⁷, with a total sample size each year of 18,000 households⁸. The results of the first wave of data, collected in 2008 with reference to 2007, were published by the Institute for the Study of Labour (IZA) in November 2011. In this paper, the urban household sample from the first wave is utilized, supplementing the three waves of CHIP surveys. Given the fact that the NBS was involved in implementing both the RUMiC and CHIP urban household surveys and that observations were drawn from the organization's strict sampling criteria, the surveys are deemed to be comparable (Qu and Zhao, 2011). The RUMiC survey was conducted in 19 cities, across nine provinces⁹. Whilst one megacity (Shanghai) is substituted for another (Beijing), the spatial

⁶ The RUMiC data was obtained through the establishment of contact with the Database Manager at IZA, Bonn, Germany. Direct access to the data is available through undertaking a research contract.

⁷ "The Longitudinal Survey on Rural Urban Migration in China (RUMiC) consists of three parts: the Urban Household Survey, the Rural Household Survey and the Migrant Household Survey. It was initiated by a group of researchers at the Australian National University, the University of Queensland and the Beijing Normal University and was supported by the Institute for the Study of Labor (IZA), which provides the Scientific Use Files. The financial support for RUMiC was obtained from the Australian Research Council, the Australian Agency for International Development (AusAID), the Ford Foundation, IZA and the Chinese Foundation of Social Sciences."

⁸ 5,000 urban households, 8,000 rural households and 5,000 migrant households (ANU, 2011).

⁹ The nine provinces in the RUMiC urban household survey are: Henan, Jiangsu, Sichuan, Hubei, Anhui, Shanghai, Zhejiang, Guangdong and Chongqing (IZA, 2011). Four of these provinces are identical to the provinces included in the 1988 CHIP survey, 5 are identical to the provinces included in the 1995 CHIP survey and 6 identical to the provinces included in the 2002 CHIP survey (Yang, 2005; Appleton and Song, 2009; Démurger, Gurgand, Shi and Ximing, 2008).

distribution of the provinces included in the RUMiC survey is narrower than the CHIP surveys, concentrating on the Bohai, Central and South-eastern regions. In contrast, the CHIP surveys supplement the Central and South-eastern regions with the inclusion of a province from the Northeast (Liaoning), two provinces from the Northwest (Gansu and Shanxi), as well as the provinces of Yunnan and Chongqing, to supplement Sichuan in the Southwest (World Bank, 2006). The cities within these provinces may contain greater degrees of variation in the levels of economic development than those urban centres located closer to the more economically developed South-eastern coastline. Therefore, the samples obtained from the CHIP surveys have the potential advantage of better representing the urban population across China as a whole. Due to the unavailability of supplementary survey information, it is not possible to pinpoint the number of individuals remaining in each of the sampled locations, once missing observations have been dropped. The fact that each of the cross-sections contain substantial observations, however, can be viewed as boosting the validity of each sample.

Notably, a question pertaining to the adult household member's attainment of Communist party membership is not to be found within the RUMiC survey. As opposed to the CHIP, individuals both with and without urban hukou status are sampled. Also, rather than splitting received income into different categories, respondents are asked to provide a numerical value for their average monthly income from all sources combined, meaning that allowances and commutations in-kind are added on top of wages, bonuses and subsidies. This could potentially result in overestimated values of wages, compared with the estimates obtained from the CHIP data. The researcher is also required to manually multiply the average monthly wage by 12, as this calculation is not provided by the publisher. In all other relevant aspects, the questions are similar in nature to those present in the CHIP questionnaires. The same caveat related to the potential inaccuracy of individuals recalling past income applies to the RUMiC data nonetheless.

4.3. Comparison between the samples

To ensure an appropriate representation of the labour force and consistency between the two data sources, only workers between the ages of 16 and 60 enter the regressions in this paper, in compliance with the minimum working age and mandatory retirement age, respectively (Démurger, Fournier and Chen, 1997; Zhang, Zhao, Park and Song, 2005). Other authors have nevertheless used alternative sampling approaches. Qiu and Hudson (2010) include respondents between the age ages of 15-65 in their sample, whilst Zhao and Zhou (2002) focus on relatively older workers, between the ages of 25-65.

Wages estimated from both data sets are calculated as the sum of the basic wage received, with the addition of bonuses and an average value for subsidies. This estimation method is broadly in line with the empirical literature (Qiu and Hudson, 2010). Residual provisions from the employer are not included and neither is income from secondary employment.

Retirees and students are omitted from the samples, as are those who either do not work full-time or do not receive an income. Those individuals who report their primary occupation as owning and managing individual enterprises were omitted, so that a distinction between the returns to human capital and private capital can be made (Maurer-Fazio, 1999). Contract workers, both short-term and long-term enter the regressions, to reflect the increasing use of contracts in Chinese workplaces since the mid-1980s, in line with the provision of greater managerial autonomy by the State. No *a priori* expectation for higher wages for short-term contracts, compared to long-term contracts exists, therefore both enter the regressions.

5. Estimating the returns to education

5.1. Model specifications

A simple earnings function involves an ordinary least squares (OLS) regression on the natural logarithm of annual earnings as the dependent variable, with years of schooling, potential labour market experience and its square as independent variables. This earnings function takes a log-linear form, whereby the coefficient on years of schooling can be interpreted as the average rate of return to an additional year of education. This is a private return, excluding residual effects on society. Also, treating years of education as a continuous variable ignores specificities associated with educational credentials (Mincer, 1974; Psacharopoulos, 1994). In this paper, the baseline model¹⁰ for estimating the returns to education is therefore expressed as:

$$\ln Y_i = \beta_0 + \beta_1 S_i + \beta_2 Exp_i + \beta_3 Exp_i^2 + \varepsilon \quad (1)$$

where $\ln Y$ is the natural log of the annual earnings of an individual i , S represents years of schooling as a continuous variable, Exp is years of potential working experience with a polynomial allowing for diminishing returns to wages beyond the optimal experience level, and ε is the error term (Maurer-Fazio, 1999).

¹⁰ Subsequent numbers allocated to earnings equations indicates the estimation order, with the baseline model taking a number of one.

Given that the baseline econometric model follows Mincer's (1974) specification, two related assumptions must be acknowledged. Firstly, he assumes that human capital investments do not continue after school is finished, implying that any training completed is treated as part of work experience. Secondly, he assumes that individual earnings are constant throughout an individuals' working life. This second assumption may not hold in the long-run, if labour supply continues to outpace labour demand.

To avoid confounding effects on the dependent variable, controls for gender (*male=1*), sector of employment (*State sector=1*), minority groups (*non-Han=1*) and Communists (party members=*1*) augment the baseline model to form model two:¹¹

$$\ln Y_i = \beta_0 + \beta_1 S_i + \beta_2 Exp_i + \beta_3 Exp_i^2 + \beta_4 male + \beta_5 state + \beta_6 party\ member + \beta_7 minority + \varepsilon \quad (2)$$

Regarding the expected signs of the control variables over an extended time period, market development should reward productive characteristics but result in declining rewards to non-productive characteristics such as gender and ethnicity can be expected (Naughton, 2007, p.192). Likewise, political capital, in the form of Communist Party membership, is assumed not to increase on-the-job productivity and is expected to decline in importance relative to human capital over the course of transition. Furthermore, given that new employment opportunities may arise in a non-state sector that is most responsive to market forces, the non-state sector may be able to attract and better reward the brightest job candidates (Zhao and Zhou, 2007, p. 228).

The surveys record the highest educational level attained by respondents, rather than the number of years of schooling completed. This is a shortcoming of the data and requires the conversion of attainment levels into numerical values. Following Li (2003), the following conversions are employed: College and above (*Daxue*: 16 years), three-year upper-

¹¹ The State sector includes State-owned enterprises, government agencies and other public enterprises. All other employment is grouped into the Non-State sector. The empirical literature tends to include individual dummy variables for the collective sector, the private sector and FIEs. Based on the frequency of observations in the sample, more meaningful comparisons between the state sector and a more comprehensive non-state sector can be made, particularly before 2002. Regarding the choice of control variables, a control for industrial sector was trialled, but this did not change the results significantly. The surveyed workers belong to certain industry sectors, with the largest proportions in each sample working in manufacturing, followed by wholesale and retail trade. Although a potential source of bias is acknowledged here, not including a control variable for sector remains largely consistent with the empirical literature on returns to education in China. In addition, since education is considered as a means of enhancing productivity in relation to the use of technology or in a production process, as specified in the theoretical framework, it becomes a subjective task to eliminate industrial sectors that do not rely on at least one of these conditions, without further information about the sector in question.

Professional School or Community College (*Dazhuan*: 15 years), 2 or 3 year middle-level professional or technical school (*Zhongzhun*: 12 years), upper middle school (also 12 years), lower middle school (9 years), elementary school (6 years) and below elementary school (2 years). As two years is the minimum amount of education ascribed, illiterate individuals are not considered in the estimated wage equations. Münich, Svejnar and Terrell (2005) caution against the imputation of years of schooling, given the potential bias that may result, but given the information in the datasets at hand, no alternative option is available.

Methodologically, treating years of education as a continuous variable contains some weaknesses which must be pointed out. Assigning 16 years of education to college graduates results in the grouping of all tertiary degrees, regardless of length. This would, for instance, treat Master-level and Bachelor-level studies equally. Also, the effect of moving from one level of educational attainment to the next is interpreted identically. Graduation from college, however, would be expected to boost productivity more than the completion of junior middle school, for instance. ‘Sheepskin effects’, that is, the increase in wages when specific educational credentials are involved, are thus ignored (Hungerford and Solan, 1987; Harmon, Oosterbeek and Walker, 2003). Also, if a student is required to repeat a year of schooling, this could over-inflate the returns to schooling (Li, 2003).

Given the weaknesses in treating education as a continuous variable, equation one can be modified to estimate the returns to education at different levels. In this way, the results can supplement those obtained under the first specification. Practically, adjusting the model to distinguish between different levels of education requires a series of dummy variables to represent specific educational attainment. Estimating the returns to education now involves a comparison of dummy variable coefficients between specific attainment levels (Qian and Smyth, 2008). Psacharopoulos (1994) contends that relatively few researchers estimate the effects on earnings by different education levels. Xie and Hannum (1996) suggest it is prudent not to treat education in China as a continuous variable, given the unfamiliarity of contemporary China. Knowledge of the Chinese labour market and educational system has, advanced, however, since the time this particular article was written.

Focusing on the completion of specific educational levels rather than years of schooling contains a notable drawback, however. Crucially, dropouts are masked in the sample, meaning that a student who completes lower middle school, for instance, may complete one or two of the required three years of technical school that follows, without actually graduating. Such instances would mean workers have greater skills than they are given credit

for with the rigid classification system employed. Since the majority of urban residents have completed a minimum of primary school education, as a result of the introduction of universal compulsory education (Qian and Smyth, 2007), the use of completed elementary schooling as a reference category allows for meaningful comparisons to be made.

Further modification of model two thus yields:

$$\begin{aligned} \ln Y_i = & \beta_0 + \beta_1 S_i + \beta_2 Exp_i + \beta_3 Exp^2_i + \beta_4 daxue + \beta_5 dazhuan + \beta_6 upper\ secondary\ school + \\ & \beta_7 junior\ middle\ school + \beta_8 below\ elementary\ school + \beta_9 male + \beta_{10} state + \beta_{11} party\ member + \\ & \beta_{12} minority + \varepsilon \end{aligned} \quad (3)$$

The use of OLS may bias the returns to education since a proxy for innate ability is not included in the regressions. If an individual possesses unobserved personal characteristics that facilitate academic success, OLS will over-estimate the returns to schooling (Li, 2003). Including a proxy for ability would theoretically reduce the co-efficient on years of schooling, with this variable now capturing schooling alone (Harmon, Oosterbeek and Walker, 2003). However, the inclusion of a proxy for ability requires appropriate survey questions to be asked, which are not included in the CHIP surveys. Alternative testing methods, such as the IV estimation technique, also have strict data requirements, not compatible with the data at hand (Qian and Smyth, 2007; Yang, 2010, p. 335).

The introduction of an interaction term between education and experience is introduced into the earnings equation to shed light on whether the returns to newly-completed education are greater than education completed in the distant past¹². An investigation into the value of education of older vintages is justified when the obtained results over multiple cross-sections, point to rising returns to education. As the explanatory variables are restricted to have the same effect over time, improvements in educational quality, for instance, may over-inflate the estimated schooling co-efficients (Li, 2003; Qian and Smyth, 2008). Modifying model three, with education expressed as a continuous variable, yields:

$$\begin{aligned} \ln Y_i = & \beta_0 + \beta_1 S_i + \beta_2 Exp_i + \beta_3 Exp^2_i + \beta_4 S * Exp_i + \beta_5 male + \beta_6 state + \beta_7 party\ member + \\ & \beta_8 minority + \varepsilon \end{aligned} \quad (4)$$

¹² The 'distant past' or the 'past' is assumed econometrically to be in an earlier cross-section from the one in question. For instance, the 1988, 1995 and 2002 results are considered to be in the 'past', when the discussion focuses on the 2007 results.

where $S * Exp$ represents the interacted education-experience term. A negative sign on the coefficient is an indication that the return to education is greater for recently acquired education, or for less experienced workers. There are no grounds to expect a particular sign or magnitude of the interaction term, given the variability of the outcomes obtained across countries and the limited research on measurable quality improvements in China's educational system (Byron and Manaloto, 1990).

Consistent with the estimation methods employed in this paper so far, it is also possible to interact each educational attainment level with experience, rather than treating education as a continuous variable. In doing so, the hope is to shed further light on the magnitude of vintage effects for particular education levels. The estimated model therefore becomes:

$$\begin{aligned} \ln Y_i = & \beta_0 + \beta_1 Exp_i + \beta_2 Exp^2_i + \beta_3 male + \beta_4 state + \beta_5 party\ member + \beta_6 minority + \beta_7 daxue + \\ & \beta_8 dazhuan + \beta_9 upper\ secondary\ school + \beta_{10} junior\ middle\ school + \beta_{11} below\ elementary \\ & school + \beta_{12} Daxue * Exp + \beta_{13} Dazhuan * Exp + \beta_{14} upper\ secondary\ school * Exp + \beta_{15} junior \\ & middle\ school * Exp + \beta_{16} below\ elementary\ school * Exp + \varepsilon \end{aligned} \quad (5)$$

Years of potential work experience, although not asked of respondents in the surveys pertaining to 1988 and 2007, can be estimated through the transformation ($Experience = Age - S - 6$). This involves the assumption that elementary schooling begins at six years of age. In accordance, it must also be assumed that time not spent in formal schooling was spent gaining on-the-job experience (Johnson and Chow, 1997).

5.2. Descriptive statistics

Table 1 presents the variable means of the included variables in the four cross-sections. Respondents with zero income were eliminated from the sample, in order for the semi-logarithmic functional form to be meaningful (Byron and Manaloto, 1990).

Workers in the RUMiC sample are better educated and more experienced than those in the CHIP samples. 11.6 years of schooling are completed on average in the 2007 sample, compared with an average of 10.1 years across the 1988-2002 period. Estimated time in the labour force is five years greater in 2007 (26.2) compared with the average between 1988 and 2002 (21.2). The average age of respondents is higher in the RUMiC sample (41 years) compared with the CHIP average (37.9 years). The latter result could reflect a compositional shift in the Chinese labour market. Interestingly, over half of the sampled labour force were on long-term contracts in 2007, a greater share than permanently employed workers,

for which a declining trend over the entire 19-year time period is evident. The results of the correlations between the included variables indicate that multicollinearity is not a cause for concern (refer to appendix E).

Table 1: Variable Means for workers in China, 1988-2007

Variable	1988	1995	2002	2007
Log earnings (yuan)	4.9	8.9	9.0	9.9
Years of schooling	9.7	9.9	10.6	11.6
Educational Attainment Levels:				
University	5.4	6.0	7.0	13.1
Community College	5.7	10.0	14.3	17.9
Upper Middle School/Technical School	31.5	32.5	33.2	34.5
Junior Middle School	35.9	28.1	21.1	24.7
Elementary School	13.9	15.1	12.5	6.9
Below Elementary School	7.5	8.6	5.9	2.8
Sex (% male)	49.4	49.6	49.2	49.5
Communists (% party members)	21.4	18.4	21.2	
Ethnicity (% minority)	3.6	4.5	4.4	1.3
Sector (% state employees)	77.0	85.7	51.0	57.7
Labor Force Duration (years)	21.9	21.6	20.1	26.2
Age (years)	36.2	38.1	39.5	41.0
Employment Nature:				
% Permanent	97.7	80.1	60.9	40.6
% Long-term Contract workers		17.2	25.4	51.3
% Short-term Contract workers	2.24	2.7	13.7	8.1

Note: The 1988 CHIP survey does not distinguish between permanent workers and long-term contract workers.

6. Empirical results

The results of the estimated regressions 1-5 are reported in appendix A. Step-wise regression, whereby control variables are added to the baseline regression to form model two, does not alter the sign or significance levels of the explanatory variables, education and experience. Unless otherwise stated, estimations come from this model specification, given the potential for interference in the baseline model.

The returns to schooling co-efficient declines with the addition of control variables in all years except for 2007. The fact that no control for communist party membership is included in the latest estimates suggests that not all outside influences are accounted for in this particular specification. Given the large amount of information included in the datasets overall, a goodness-of-fit value ranging from 12-27 percent over the four cross-sections, signifying only partial predictive power of the applied models, was to be expected. The diagnostic tests carried out did not reveal the need for further adjustments, therefore they are not reported.

6.1. The returns to education in China, 1988-2007

An excerpt of the co-efficients on the schooling variable is provided in table 2. The estimated education co-efficient is statistically significant at the one percent level and carries a positive sign in all four cross-sections between 1988 and 2007. That is, in a Chinese context, the completion of schooling leads to productivity-augmenting skills which are rewarded through higher earnings, in support of Becker's (1964, p.1) conjecture. Specifically, the marginal return to education was 2.6 percent in 1988, increasing to 3.9 percent by 1995. By 2002, the marginal return reached 7.2 percent before increasing again to 9.6 percent in 2007.

Table 2: The Co-efficient on years of schooling 1988-2007.
Excerpt from model 2.

1988	1995	2002	2007
0.0263***	0.0391***	0.0716***	0.0964***
{0.0010}	{0.0022}	{0.0033}	{0.0040}

The estimates of the return to schooling obtained in the three cross-sections preceding 2007 are generally comparable with the results in previous studies, albeit under-estimated. For instance, an estimated return of 7.2 percent in 2002 sits marginally below the estimate of 7.5 percent of Appleton Song and Xia (2005). An estimated rate of return of 3.9 percent in 1995, is below the estimate obtained by Li (1995), differentiated by gender. Meanwhile, the 1988 estimated return of 2.6 percent sits marginally outside the previously estimated range of 2.7-4.5 percent (Meng and Kidd, 1997; Liu, 1998; Maurer-Fazio, 1999). The inclusion of an average numerical value for subsidies and bonuses received, with the exclusion of income from outside sources such as secondary employment, may account for the observed under-estimation.

On the surface, deferred potential income appears to have increased over a 19 year period, creating increased incentives for private investment in education, as specified by Mincer (1974, p.7). In addition, an increase in the return to education over time would appear to be in line with Nee's (1989, p.678) transition theory and is in support of hypothesis one, whereby the permeation of market forces means a more accurate valuation of productive characteristics.

The fact that the return to education rose throughout the surveyed time period also lends evidence to the theory that education's value was held down in a centrally-planned economic system in the pursuit of income equalisation policies (Campos and Jolliffe, 2003) rather than the conjecture that education was overly-specialised to the point of being completely inapplicable once transition commenced, given rising returns in 1988 in particular (World Bank, 2003).

An estimate of the return to education in 2007 of 9.6 percent is a useful complement to the existing empirical literature, given that the most recent estimate of Chinese schooling returns are based on the year 2005 and the majority of the estimates are dated to 2002. By comparison, a rate of return of 9.6 percent is greater than the return of 7.1 percent, reported by Qiu and Hudson (2010) for 2000, as well as the return of 7.5 percent reported by Appleton, Song and Xia (2005) in 2002. Qian and Smyth (2008) report a return of 12.1 percent for 2005, but the data utilized by the authors was restricted to only three provinces and one city, whereas the RUMiC data is more extensive in its geographical coverage.

Importantly, this paper's estimate of a 33 percent increase in the return to schooling between 2002 and 2007 is considerably lower than the 85 percent increase between 1995 and 2002. This may reflect the fact that China has begun to reach the maturity stage of economic transition, with the existing constraints on wage-setting having been largely removed (Fleisher, Sabirianova and Wang, 2005; World Bank, 2010). Institutional changes, such as the ending of guaranteed lifetime employment in the state sector, the increased use of contracts and a diversification in ownership structure can be seen to have improved the competitiveness of the labour market, with the increased rewarding of the most productive workers.

6.2. The returns to education in context

6.2.1. A comparison with other transition countries

Table 3 reports the latest returns to education for a selection of transition nations covering Eastern Europe and Russia, as documented in the empirical literature. China's schooling estimate of 9.6 percent for 2007 falls below the rates reported in Hungary and Poland, but is greater than the listed returns for the other transition nations, 11 years on average into their respective transition periods.

Table 3: Returns to education in a selection of transition countries, 2002

Country	Reform Commencement	Return to Schooling (%)
Bulgaria	1992	7.2
Czech Republic	1991	6.6
Hungary	1990	11.1
Poland	1990	10.6
Romania ¹³	1992	8.5
Russia	1992	7.4
Slovak Republic	1991	6.1
Slovenia	1991	8.2
Ukraine	1992	4.5

Source: Fleisher, Sabirianova and Wang (2005); Flabbi, Paternostro and Tiongson (2008)¹⁴

Given that China began economic reforms earlier, this result indicates that returns to education in China have risen comparatively slowly. After an equivalent reform duration, China's return was only 2.6 percent. Indeed, China has favoured a gradual approach to economic reforms, whereas most of the Central and Eastern European countries and Russia (CEER) underwent sudden economic restructuring. Fleisher, Sabirianova and Wang (2005) report that after five years, the CEER countries were essentially market economies in terms of market-determined prices and wages, open foreign trade, largely completed privatization programmes and a significant share of private ownership. The earlier discussion of labour market reforms made reference to the expansion of foreign trade and a greater role for the private sector in China. It took two decades into the reform process for this to occur. Schultz's (1975) theory that education can help individuals to cope in times of economic turbulence can be applied here to explain higher rates of return to schooling in the CEER countries than in China, given the advantages associated with rapid economic change that can become available for exploitation by qualified individuals (Fleisher, Sabirianova and Wang (2005).

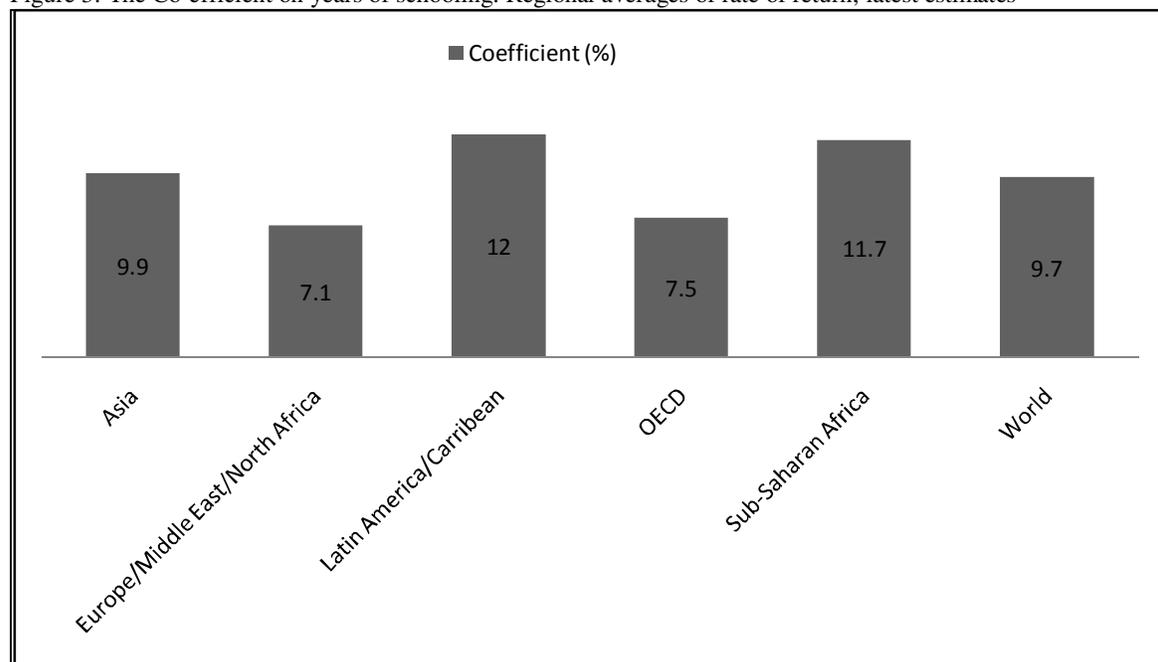
¹³ An estimated return to education of 8.5 percent in Romania is reported for the year 2000, instead of 2002. The estimates reported here are largely comparable, given a model specification that includes only years of experience (linear and squared), a dummy for gender and a constant by Flabbi, Paternostro and Tiongson (2008)

¹⁴ The estimates reported here are largely comparable from the perspective of the model specification including only years of experience (linear and squared), a dummy for gender and a constant.

6.2.2. A broader international comparison

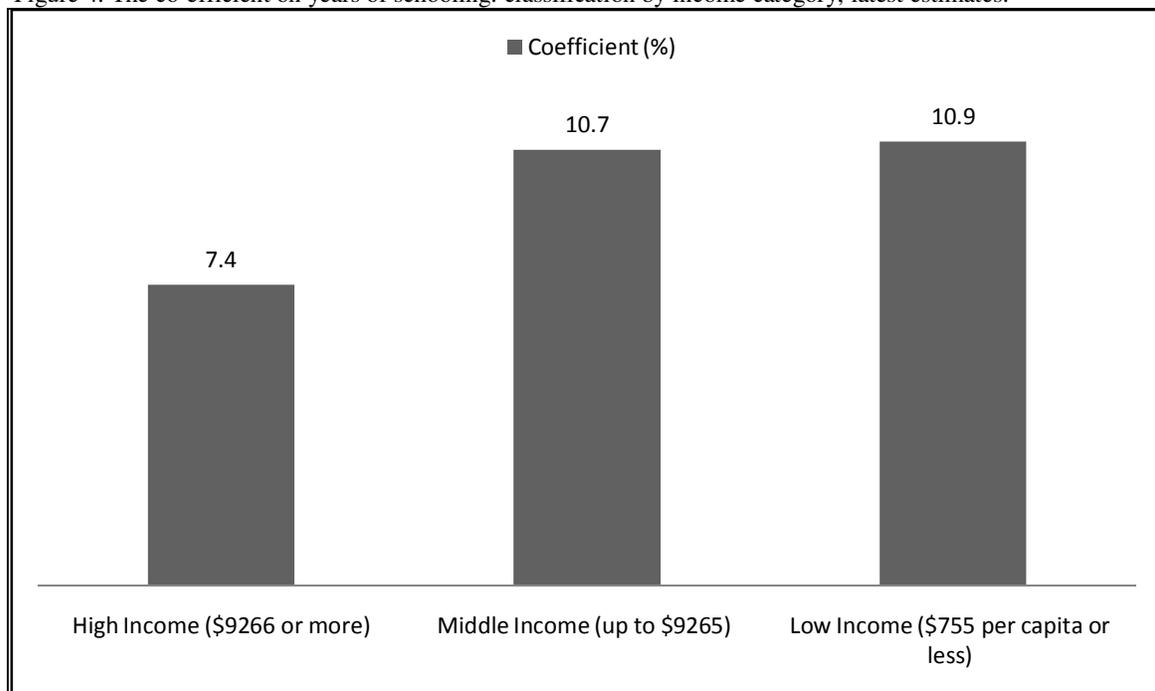
The global mean rate of return to education in 2004 was 9.7 percent, a decline of 0.4 percentage points since 1994. An estimated return in China of 9.6 percent in 2007 therefore falls marginally below the world average, including an average of 9.9 percent across Asia as a whole, 12 percent in Latin America and 11.7 percent in Sub-Saharan Africa. Hence, private incentives to invest in education are greater outside of China (Byron and Manaloto, 1990). The Chinese return is also lower than the mean rate of return found across low income and middle income countries of 10.9 and 10.7 percent, respectively, but greater than the return found in high-income countries of 7.4 percent. This result is commensurate with falling returns to education by level of economic development, as theorised by Psacharopoulos and Patrinos (2004). By implication, the concept of diminishing returns, normally applied to tangible factors of production such as land and capital equipment, can also be extended to apply to intangible human capital. The information regarding regional average returns to education and returns according to income category is illustrated in figures 3 and 4, respectively.

Figure 3: The Co-efficient on years of schooling. Regional averages of rate of return, latest estimates



Source: Psacharopoulos and Patrinos (2004)

Figure 4: The co-efficient on years of schooling: classification by income category, latest estimates.



Source: Psacharopoulos and Patrinos (2004)

Worldwide, Psacharopoulos and Patrinos (2004) contend that an increase in the average amount of schooling being received, measured in years of education, together with a marginal decline in the rate of return to education, signifies that skills are being supplied beyond the capabilities of employers to reward them. In a Chinese context, although rates of return have been rising since 1988, mean returns below the world average can be partially explained by domestic labour market disequilibrium, whereby the supply of labour outstrips the demand for labour (Qiu and Hudson, 2010). Excess human capital is therefore priced downwards

The international comparisons conducted in this section; across region and income category, diminish the positive results reported in section 6.1 somewhat. They are utilised in this study as a benchmark, to put the Chinese results into a wider context. In sum, although domestically the private incentive to invest in education has risen over time, the rewards for the possession of schooling and knowledge in China are comparatively low by international standards.

6.3. The returns to education in China by attainment level, 1988-2007

Table 4 presents the results of estimates on the returns to education in China by specific levels of schooling completion. The co-efficient on the return to university education is significant in all four cross-sections and indicates that a wage premium exists for the completion of a bachelor's degree or higher, over the completion of six years of elementary school. The results suggest that out of all the educational attainment levels, the completion of university education yields the largest wage premium, increasing by 57.3 percentage points over a 19-year period¹⁵. The wage premium accruing to community college education increased over the four cross-sections by 35.6 percentage points, as did lower middle school by a proportionately lower amount, however the co-efficients for this level of education are not significant in 1995 and 2007. The premium to upper middle school education increased up until 2002, but declined by 2007, suggesting that increased educational credentials beyond the secondary level became relatively more important in the Chinese labour market further into the transition period. Education below the elementary level is significant at the five percent level in 1988 only, with a negative sign indicating that the completion of at least elementary education, ten years into reforms, was important in the infant labour market.

Table 4: The Co-efficient on schooling levels¹⁶. 1988-2007.

Excerpt from model 3

	1988	1995	2002	2007
University	0.2719*** {0.0136}	0.3582*** {0.0350}	0.8089*** {0.0554}	0.8448*** {0.0736}
C. College	0.2152*** {0.0138}	0.2853*** {0.0335}	0.5597*** {0.0438}	0.5712*** {0.0723}
U. Middle	0.1431*** {0.0110}	0.1821*** {0.0316}	0.3295*** {0.0408}	0.2464*** {0.0750}
L. Middle	0.0554*** {0.0107}	0.045 {0.0320}	0.0184*** {0.0409}	0.0882 {0.0715}
B.Elementary	-0.0577** {0.0233}	-0.0976 {0.0839}	-0.1977 {0.1296}	0.0207 {0.1484}

¹⁵ Given the fact that the utilized data does not distinguish between sector of industry, it must be assumed, however crudely, that mental labour is more likely to be correlated with upper levels of education, rather than manual labour.

¹⁶ Where C.College represents Community College, U. Middle represents Upper Middle School, L. Middle represents lower middle school and B.Elementary represents a level of education below elementary school. The reference category is six years of elementary school.

It is also of interest to calculate the wage premiums for specific educational attainment levels in 2007, given that the empirical literature has not done so. From table 4, the wage premium for the completion of university education is 85 percent above elementary education, compared with 57 percent for community college, 25 percent for upper middle school and 9 percent for lower middle school, respectively. Education below the elementary level has an estimated co-efficient above elementary school completion, but this co-efficient is insignificant.

As an alternative to comparisons with a reference category, table 9 calculates the wage premium to each individual educational attainment level, above its adjacent school level (refer to appendix C). For example, the premium to university education is 27 percent, compared with community college education in 2007. An increasing wage premium to university completion over lower levels of education suggests that the labour market is sufficiently competitive to be able to distinguish between manual and mental labour, if the rate of return to education is viewed as a reasonable proxy for productivity (Blaug, 1972; Pepper, 1990, p.2). A caveat to this theoretical approach concerns the interpretation of community college education, which may be more applied than a university degree.

6.4. The returns to productive and unproductive worker characteristics, 1988-2007

The returns to experience are reported in table 5. Experience can be considered as a productive worker characteristic since a greater amount of time on the job can improve the speed with which tasks are accomplished. Between 1988 and 2007, as the return to education have risen, the return to experience has noticeably declined. This is a significant reversal of the reward to seniority that accompanied pre-reform remuneration in China. Despite being positive and significant, a 1.9 percent increase in returns to experience in 2007 is lower than the 3.5 percent recorded in 1988. This result further highlights the increased importance of accumulating theoretical skills and knowledge in educational institutions before entering employment and may also reflect the increasing complexity of the workplace tasks being performed. These results could also be interpreted as employers placing a greater emphasis on educational credentials as a means of differentiating between workers.

Table 5: The Co-efficient on years of experience and experience-squared, 1988-2007.

Excerpt from model 2.

	1988	1995	2002	2007
Experience	0.0356*** {0.0010}	0.0372*** {0.0024}	0.0246*** {0.0036}	0.0191*** {0.0038}
Experience ²	-0.0004*** {0.0000}	-0.0005*** {0.0001}	-0.0002** {0.0001}	-0.0003*** {0.0008}

The inclusion of a squared experience term produces a negative sign, as expected, capturing the life-cycle of earnings. Using partial differentiation, marginally lower wage rises set in after the completion of the first year of work experience, before eventually becoming negative after 40 years in 1988 and becoming negative after 31.7 years in 2007. The more rapid onset of decreasing returns to seniority could indicate the relative higher value of education at a later transition stage.

Against expectations, the wage premium to the non-productive worker characteristics related to gender and communist party members¹⁷ both increased over the sample period, as illustrated in table 6. The return to males increased dramatically over the period by 20.7 percentage points over females. An important comparison to make here is that gender discrimination also features in the labour markets of more developed countries, so the increased return to male workers, particularly since 2002 could reflecting a maturing labour market in China. Meanwhile, between 1988 and 2002, Communist party members enjoyed an advantage of 3.6 percentage points over non-members.

The negative sign on the co-efficient for non-han ethnicity, significant at the five percent level in both 1988 and 2007, suggests that discrimination worsened over the 19 year period, with migrants at a 20 percent disadvantage compared with the Han majority. Conceivably, the increased temporary employment opportunities for migrants, due to the relaxation of household registration requirements could have led to an over-supply of unskilled labour. Rather than bidding up wages because of increased competition in the labour market, as expected, an increased supply of migrant workers could have forced down wages down for the most unattractive work positions.

¹⁷ As discussed in the data section, a question pertaining to whether survey respondents were Communist Party members was not included in 2007

Table 6: The Co-efficient on non-productive characteristics, 1988-2007.
Excerpt from model 2.

Variable ¹⁸	1988	1995	2002	2007
Male	0.0721*** {0.0056}	0.0603*** {0.0115}	0.1899*** {0.0158}	0.2789*** {0.0167}
Member	0.0506*** {0.0064}	0.0840*** {0.0134}	0.0863*** {0.0185}	
Migrant	-0.0244** {0.0111}	-0.0223 {0.0267}	0.0292 {0.0382}	-0.2001** {0.0808}
State	0.1041*** {0.0078}	0.0620*** {0.0145}	0.1000*** {0.0157}	0.0312* {0.0173}

State sector employment maintained its wage premium over non-state employment throughout the 19 year period, but this premium diminished overall, with the 2007 estimate observed to provide a wage premium of 3.1 percent. In other words, diversification of employment opportunities have turned out to be increasingly lucrative outside of a state sector which can no longer guarantee lifetime employment and is increasingly unable to pay wages above marginal product.

6.5. The vintage effects of education in China, 1988-2007

Results from the interacted education-experience term, reported in table 7, can shed light on whether education acquired in the past has become obsolete. Such an outcome would be in line with Mincer's (1974, p.8) belief in human capital as an investment subject to depreciation in a more advanced analysis of the returns to education.

Table 7: The Co-efficient on the interacted education-experience term, 1988-2007. Excerpt from equation 4.

	1988	1995	2002	2007
	-0.0006*** {0.0001}	-0.0009*** {0.0002}	-0.0011*** {0.0003}	-0.0027*** {0.0004}

¹⁸ Where 'Member' refers to card-carrying Communist Party members, 'Migrant' refers to those of non-han Ethnicity and 'State' refers to state sector employees

Upon viewing the results in table 7, it is immediately noticeable that the interaction term is statistically significant at the 1 percent level and that it takes a negative sign which becomes larger in each successive survey year. The estimated negative co-efficient signifies that education is of greatest value at the commencement stage of employment, supporting the conjecture of Rosenzweig (1995). Once a worker spends more time on the job, work experience becomes more useful compared to the value of the initial investment in education. This result is in line with the theory put forward by Campos and Jolliffe (2003) and supports hypothesis two; it is the youngest workers, those with the least amount of work experience, that are best able to adjust to a changing economic environment, as they are armed with newly-completed skills and knowledge which deliver an increased monetary return compared to out-dated skills and knowledge. Whilst relatively more experienced workers can utilise what they have learned on the job, rather than in a formal learning institution, this experience is not necessarily protection from retrenchment, nor does it help in adapting to a changing industrial structure (Maurer-Fazio, 1999).

The obtained results from this model specification are consistent with the empirical research on the vintage effects of education in China using pre-2007 data, whereby more recent graduates receive relatively higher wages than those who graduated earlier (Liu, 1998; Qian and Smyth, 2008; Qiu and Hudson, 2010). The contribution of the new estimate for 2007 is nevertheless notable in that the co-efficient on the education-experience interaction term more than doubles in magnitude between 2002 and 2007, suggesting a relative increase in the usefulness of newly-completed schooling in this period, compared with previous periods.

An examination of the effects of newly completed education by specific attainment levels is facilitated by the results of earnings equation five (refer to appendix B). A negative sign accompanying the interacted co-efficient terms is largely present, especially at higher levels of educational attainment, complementing the results obtained in table 7. Specifically, university education becomes larger in size in 2002 than 1988. This indicates that the returns to newly-completed tertiary education have improved relative to elementary education. The usefulness of newly-completed community college education, on the other hand, has marginally worsened compared to the reference category over the same time period. Outside of the highest educational attainment levels in the two aforementioned cross-sections, the results are otherwise statistically insignificant.

Obtained empirical results suggesting that the returns to newly-completed education have increased require interpretation. If the focus is placed on the depreciation of previously-acquired schooling, then Rosen's (1975) belief in the ability of technology to update existing knowledge must be considered. If any stock of knowledge is to be affected by external change, then post-secondary schooling would seem the most likely, being necessary to harness sophisticated new technology. Although the interacted education-experience variable doubles in magnitude between 2002 and 2007, and coincides with increased FDI into China after WTO accession in 2001, the education system would plausibly take time to adjust, with six years unlikely to be long enough. The co-efficient on the newly-completed university education variable is also not statistically significant in 2007. Viewed at an earlier time period, however, an increase in the interacted co-efficient for overall education and experience between 1995 and 2002, ten years after the initial surge of FDI in China began, is matched by a significant value of newly completed university education in 2002. Some external impact on the usefulness of higher education over a ten year time period is plausible.

Alternatively, if the focus of analysis is accounting for improvements in recent returns to education, given an increasing magnitude in the interacted co-efficient, a maturing labour market appears to be a reasonable explanation. The same can be said for an improvement in overall educational quality, although this does not necessarily have to be influenced by the influx of new technology. If the quality of education provided in China is believed to have improved over time, more than a decade after curriculum reforms were emphasised in government educational policy, then the estimated co-efficients obtained in section 6.1 may be considered to be over-estimated (Li, 2003). At any rate, the value of newly completed education has increased over a 19 year period, and this is posited to have increased the incentive to invest in schooling.

7. Conclusion

This paper set out to update the empirical estimates of the returns to education in China with access to a recently-released urban household survey for 2007. In regards to the first research question, an estimate of 9.6 percent is used as evidence to point to an increased incentive for individuals to invest in education in the country, compared to the three previous snapshots of the urban population's rate of return earlier in the transition process. University education exhibited the largest wage premium, making it the most profitable educational attainment level, reflecting the increased value of greater academic credentials in the Chinese

labour market. Updated results on the returns to education can hopefully contribute to the existing knowledge in the field of wage determination.

Rather than looking at the returns to workers possessing diverse levels of experience in the four cross-sections, a negative co-efficient on the interacted education-experience interaction term was used as evidence to support the claim that recently-completed education has increased in value relative to education completed in the past, being most useful at the commencement stage of employment, answering the final research question.

Given the considerable institutional changes that have taken place within the Chinese labour market since the commencement of the economic reform period, such as the emergence of profitable employment opportunities outside of the state sector, it does not seem unreasonable to suggest that skills and knowledge are now in a position to be better rewarded than they used to be. Internal changes related to both school curriculum and the rules regarding mandatory education in particular, are also plausible explanations for the greater usefulness of newly-acquired skills and knowledge. These factors must be considered in a discussion of the worth of human capital alongside labour market changes.

Although the rate of return to education has increased within China, with schooling appearing to be more profitable than in the early-reform period, the nation's estimated returns are low by both transition country and international standards. This result highlights the idiosyncrasies of the Chinese labour market, highlighted by the increased return awarded to non-productive characteristics such as communist party membership over time.

There is scope for the further updating of the returns to education in China, whereby educational attainment outcomes, and thus the incentive to invest in education, can be tracked for the same set of individuals, rather than examining the results from four isolated cross-sections. The future availability of complete RUMiC panel data for the time period 2008 and 2012 should facilitate this. In addition, further investigation into the specific skills and knowledge imparted in Community College institutions would be welcomed, to better distinguish such learning institutions from universities

For the purposes of developing public policy, some tentative recommendations can be made. For example, Chinese policymakers have a role to play in continuing to monitor and enforce the delivery of quality skills and knowledge in educational institutions, without stifling the autonomy of the institutions in question. Meanwhile, a decline in the wage premium for secondary school education over elementary education between 2002 and 2007,

suggests that quality audits should not be restricted to the tertiary level. Significant government investment in education at all levels must be sustained. Improvements in the quality of education can help China to become more competitive globally, in terms of achieving breakthroughs in scientific research and the ability to outbid other nations for production contracts utilising more sophisticated technology. This could in turn create more jobs, alleviating the present labour market disequilibrium to some extent.

Since the labour market will have to continue absorbing an increasing number of graduates and eventually laid-off workers if the state sector continues to shrink in size, increased labour supply can be expected to diminish the returns to education and lower the incentive to compete post-compulsory education. Again, policymakers have a role to play to lessen this effect. One related policy recommendation is to facilitate the ease of access to finance for private sector enterprises. Their expansion can help to absorb more idle labour, putting the skills of a substantial number of graduates to productive use.

8. Appendices

Appendix A: Complete Regression Results, Models 1-3

Explanatory Variables	{1}				{2}				{3}			
	1988	1995	2002	2007	1988	1995	2002	2007	1988	1995	2002	2007
Years of Education	0.0351*** {0.0009}	0.0452*** {0.0021}	0.0872*** {0.0023}	0.0952*** {0.0036}	0.0263*** {0.0010}	0.0391*** {0.0022}	0.0716*** {0.0033}	0.0964*** {0.0040}				
Experience	0.0358*** {0.0010}	0.0368*** {0.0024}	0.0245*** {0.0027}	0.0208*** {0.0037}	0.0356*** {0.0010}	0.0372*** {0.0024}	0.0246*** {0.0036}	0.0191*** {0.0038}	0.0362*** {0.0010}	0.0378*** {0.0024}	0.0260*** {0.0036}	0.0270*** {0.0038}
Experience ²	-0.0004*** {0.0000}	-0.0005*** {0.0001}	-0.0001 {0.0001}	-0.0003*** {0.0001}	-0.0004*** {0.0000}	-0.0005*** {0.0001}	-0.0002** {0.0001}	-0.0003*** {0.0008}	-0.0005*** {0.0000}	-0.0005*** {0.0001}	-0.0003*** {0.0001}	-0.0005*** {0.0001}
University									0.2719*** {0.0136}	0.3582*** {0.0350}	0.8089*** {0.0554}	0.8448*** {0.0736}
Community College									0.2152*** {0.0138}	0.2853*** {0.0335}	0.5597*** {0.0438}	0.5712*** {0.0723}
Upper Middle School									0.1431*** {0.0110}	0.1821*** {0.0316}	0.3295*** {0.0408}	0.2464*** {0.0750}
Lower Middle School									0.0554*** {0.0107}	0.045 {0.0320}	0.0184*** {0.0409}	0.0882 {0.0715}
Below Elementary School									-0.0577** {0.0233}	-0.0976 {0.0839}	-0.1977 {0.1296}	0.0207 {0.1484}
Male					0.0721*** {0.0056}	0.0603*** {0.0115}	0.1899*** {0.0158}	0.2789*** {0.0167}	0.0728*** {0.0056}	0.0601*** {0.0116}	0.1834*** {0.0158}	0.2729*** {0.0166}
Communist Party Member					0.0506*** {0.0064}	0.0840*** {0.0134}	0.0863*** {0.0185}		0.0505*** {0.0064}	0.0830*** {0.0134}	0.0803*** {0.0185}	
Non-Han Ethnicity					-0.0244** {0.0111}	-0.0223 {0.0267}	0.0292 {0.0382}	-0.2001** {0.0808}	-0.0240** {0.0111}	-0.0236 {0.0267}	0.022 {0.0382}	-0.2233 {0.0764}
State Sector					0.1041*** {0.0078}	0.0620*** {0.0145}	0.1000*** {0.0157}	0.0312* {0.0173}	0.1050*** {0.0078}	0.0621*** {0.0144}	0.0994*** {0.0156}	0.0236 {0.0170}
Constant	3.9824*** {0.0153}	7.900*** {0.0363}	7.6888*** {0.0392}	8.4824*** {0.0677}	3.9690*** {0.0161}	7.8835*** {0.0383}	7.7000*** {0.0524}	8.3331*** {0.0714}	4.1390*** {0.0156}	8.1707*** {0.0415}	8.1952*** {0.0517}	9.0875*** {0.0819}
No. Of Observations	15,583	8,501	10,166	6,771	15,362	8,343	6,739	5,860	15,362	8,343	6,739	5,860
R ²	0.2704	0.1359	0.1742	0.1217	0.2984	0.1487	0.163	0.1735	0.2994	0.1497	0.1674	0.192

Robust standard errors are in parentheses, utilized as a result of tests for heteroskedasticity producing p-values below designated critical values. *, **, and *** represent statistical significance at the 10%, 5% and 1% level, respectively. All models estimated via ordinary least squares. The dependent variable is the log of annual earnings.

Appendix B: Complete Regression Results, Models 4-5

Explanatory Variables	{4}				{5}			
	1988	1995	2002	2007	1988	1995	2002	2007
Years of Education	0.0419*** {0.0026}	0.0577*** {0.0055}	0.0926*** {0.0077}	0.1691*** {0.0109}				
Experience	0.0458*** {0.0018}	0.0482*** {0.0038}	0.0389*** {0.0055}	0.0755*** {0.0088}	0.0445*** {0.0020}	0.0371*** {0.0046}	0.0331*** {0.0055}	0.0394*** {0.0116}
Experience ²	-0.0005*** {0.0000}	-0.0005*** {0.0001}	-0.0003*** {0.0001}	-0.0008*** {0.0001}	-0.0005*** {0.0000}	-0.0006*** {0.0001}	-0.0003*** {0.0001}	-0.0005*** {0.0001}
University					0.4658*** {0.0489}	0.4261*** {0.1099}	1.0558*** {0.1374}	1.2349*** {0.3385}
Community College					0.4247*** {0.0480}	0.2907** {0.1075}	0.7259*** {0.1159}	0.9163** {0.3365}
Upper Middle School					0.3208*** {0.0441}	0.1558 {0.1044}	0.4642*** {0.1121}	0.6276* {0.3332}
Lower Middle School					0.1835*** {0.0435}	-0.0749 {0.1069}	0.2236* {0.1144}	0.3523 {0.3341}
Below Elementary School					-0.0181 {0.090}	-0.2572 {0.1624}	0.1493 {0.2398}	0.9333 {0.6203}
Years of Education * Experience	-0.0006*** {0.0001}	-0.0009*** {0.0002}	-0.0011*** {0.0003}	-0.0027*** {0.0004}				
University * Experience					-0.0070*** {0.0017}	-0.0035 {0.0042}	-0.0128** {0.0058}	-0.0115 {0.1003}
Community College * Experience					-0.0084*** {0.0017}	-0.0007 {0.0041}	-0.0074* {0.0044}	-0.0091 {0.0098}
Upper Middle School * Experience					-0.0064*** {0.0014}	0.0010 {0.0039}	-0.0056 {0.0041}	-0.0106 {0.0096}
Lower Middle School * Experience					-0.0039** {0.0014}	0.0052 {0.0040}	-0.0029 {0.0042}	-0.0068 {0.0095}
Below Elementary School * Experience					-0.0016 {0.0025}	0.0090 {0.0081}	-0.0175* {0.0091}	-0.0233 {0.0168}
Male	.0739*** {0.0056}	.0581*** {0.0116}	0.1874*** {0.0158}	0.2826*** {0.0167}	0.0738*** {0.0056}	0.0590*** {0.0116}	0.1816*** {0.0158}	0.2726*** {0.0167}
Communist Party Member	.0508*** {0.0064}	0.0863*** {0.0134}	0.0940*** {0.0185}		.0523*** {0.0064}	0.0848*** {0.0134}	0.0863*** {0.0186}	
Non-Han Ethnicity	-0.0237** {0.0111}	-0.0225 {0.0267}	0.0287 {0.0381}	-0.1951** {0.0789}	-0.0236** {0.0111}	-0.0247 {0.0267}	0.0239 {0.0381}	-0.2185*** {0.0763}
State Sector	0.1020*** {0.0078}	0.0610*** {0.0142}	0.0992*** {0.0157}	0.0293* {0.0171}	0.1019*** {0.0079}	0.0615*** {0.0141}	0.0982*** {0.0156}	0.0226 {0.0170}
Constant	3.7719*** {0.0340}	7.6547*** {0.0731}	7.4359*** {0.0999}	7.1425*** {0.1774}	3.9601*** {0.0465}	8.1983*** {0.1054}	8.0519*** {0.1128}	8.7038*** {0.3441}
No. Of Observations	15,362	8,343	6,739	5,860	15,362	8,343	6,739	5,860
R ²	0.3006	0.1502	0.1645	0.1801	0.3014	0.1518	0.1688	0.1926

Robust standard errors are in parentheses, utilized as a result of tests for heteroskedasticity producing p-values below designated critical values. *, **, and *** represent statistical significance at the 10%, 5% and 1% level, respectively. All models estimated via ordinary least squares. The dependent variable is the log of annual earnings.

Appendix C: Calculation: Returns to specific educational levels, 2007.

Given a modification of equation three¹⁹ such that:

$$\ln Y = \beta_0 + \beta_1 \text{University} + \beta_2 \text{Community College} + \beta_3 \text{Upper Middle School} + \beta_4 \text{Lower Middle School} + \beta_5 \text{Below Elementary School} + \varepsilon$$

The following calculations are required, with the results presented in table x.

$$\{\ln Y \mid \text{Elementary Schooling}\} = \beta_0 \text{ [the reference category]}$$

$$\{\ln Y \mid \text{University}\} = \beta_0 + \beta_1$$

$$\{\ln Y \mid \text{Community College}\} = \beta_0 + \beta_2$$

$$\{\ln Y \mid \text{Upper Middle School}\} = \beta_0 + \beta_3$$

$$\{\ln Y \mid \text{Lower Middle School}\} = \beta_0 + \beta_4$$

$$\{\ln Y \mid \text{Below Elementary School}\} = \beta_0 + \beta_5$$

Table 8: Wage premiums by educational level, 2007

	University Premium	Community College Premium	U.Middle Premium	L.Middle Premium
University				
Community College	0.27			
Upper Middle School	0.6	0.33		
Lower Middle School	0.76	0.48	0.16	
Elementary School	0.85	0.57	0.25	0.09
Below Elementary School	0.82	0.55	0.23	0.07

¹⁹ Equation three specified in Section 6: “Estimating the returns to education”

Appendix D: Partial Derivative Calculations: maximum years of experience.

1988:

Experience 1st year= $.036*100 = 3.6\%$ (after the first year of experience, the wage increases by 3.6%)

Experience 2nd year= $.036+2(-.0004)(1)= 3.5\%$

Mean level of work experience = $.036+2(-.0004)(21.9)=1.8\%$

Maximum level of work experience = $.036+2(-.0004)(52)= -0.56\%$

Wage Turning point: $\beta_3/2*\beta_4=.036/2 *(-.0004) = 45$

2007:

Experience 1st year= $.019*100 = 1.9\%$ (after the first year of experience, the wage increases by 1.9%)

Experience 2nd year= $.019+2(-.0003)(1)= 1.8\%$

Mean level of work experience = $.019+2(-.0003)(26.2)= 0.33\%$

Maximum level of work experience = $.019+2(-.0003)(52)= -1.22\%$

Wage Turning point: $\beta_3/2*\beta_4=.019/2 *(-.0003) = 31.67$

Appendix E: Correlation matrices

2007	Years of Education	Experience	Experience ²	Male	Non-Han Ethnicity	State Sector		
Years of Education	1.0000							
Experience	-0.5468	1.0000						
Experience ²	-0.5625	0.9774	1.0000					
Male	0.0040	0.1273	0.1360	1.0000				
Non-Han Ethnicity	0.0053	-0.0041	-0.0041	-0.0056	1.0000			
State Sector	0.1396	0.0937	0.0937	0.0584	-0.0138	1.0000		
2002	Years of Education	Experience	Experience ²	Male	Communist Party Member	Non-Han Ethnicity	State Sector	
Years of Education	1.0000							
Experience	-0.2017	1.0000						
Experience ²	-0.1961	0.9649	1.0000					
Male	-0.0048	0.1866	0.2095	1.0000				
Communist Party Member	0.2123	0.2801	0.2856	0.1326	1.0000			
Non-Han Ethnicity	-0.0240	-0.0213	-0.0172	-0.0064	-0.0184	1.0000		
State Sector	0.1465	0.1621	0.1536	0.0972	0.1564	-0.0234	1.0000	
1995	Years of Education	Experience	Experience ²	Male	Communist Party Member	Non-Han Ethnicity	State Sector	
Years of Education	1.0000							
Experience	-0.1627	1.0000						
Experience ²	-0.1475	0.9627	1.0000					
Male	0.1491	0.1507	0.1784	1.0000				
Communist Party Member	0.1927	0.3121	0.3088	0.2195	1.0000			
Non-Han Ethnicity	-0.0386	-0.0053	-0.0046	-0.0076	-0.0142	1.0000		
State Sector	0.1032	0.0213	0.0350	0.0487	0.0600	-0.0095	1.0000	
1988	Years of Education	Experience	Experience ²	Male	Communist Party Member	Non-Han Ethnicity	State Sector	
Years of Education	1.0000							
Experience	-0.3728	1.0000						
Experience ²	-0.3993	0.9606	1.0000					
Male	0.126	0.0961	0.1103	1.0000				
Communist Party Member	0.2009	0.2840	0.2604	0.2671	1.0000			
Non-Han Ethnicity	0.0035	0.0067	0.0063	0.0053	0.0199	1.0000		
State Sector	0.2343	0.0371	0.0235	0.1586	0.1586	0.0014	1.0000	

Correlated variables based on model 2.

9. Reference List

Appleton, S., Song, L. and Xia, Q., 2005. Has China Crossed The River? The evolution of wage structure in urban China during reform and retrenchment. *Journal of Comparative Economics*. 33, 644-663.

ANU College of Business and Economics, Research School of Economics, 2011. *RUMiCI Survey Documentation*. [online] Available at: <<http://http://rse.anu.edu.au/rumici/documentation.php>> [Accessed 28 December 2011].

Becker, G.S., 1964. Human Capital. A Theoretical and Empirical Analysis, with Special Reference to Education. Cambridge University Press: New York and London

Blaug, M., 1972. The correlation between Education and Earnings: What Does It Signify? *Higher Education*. 1(1), 53-76. Available through: Lund University Libraries [Accessed 18 April 2012]

Borisenkov, V.P., 2010. Education Development Strategy. A view from Russia. In: N.Y. Borisenkov. and X.Zhu, ed. 2010. *Educational Reforms in Russia and China at the Turn of the 21st Century: A Comparative Analysis*. Comparative Education Research Centre. The University of Hong Kong: Hong Kong, 1-8.

Byron, R.P. and Manaloto, E.Q., 1990. Returns to Education in China. *Economic Development and Cultural Change*. 38(4), 783-796. Available through: Lund University Libraries [Accessed 17 January 2012]

Campos, N.F. and Jolliffe, D., 2003. After, before and during: returns to education in Hungary (1986-1998). *Economic Systems*. 27, 377-390. Available through: Lund University Libraries [Accessed 17 January 2012].

China Statistical Yearbook, 2011. All China Data Centre [online] Available at: <<http://chinadataonline.org.ludwig.lub.lu.se>> [Accessed 8 February 2012].

Della-Iacovo, B., 2009. Curriculum reform and 'Quality Education' in China: An Overview. *International Journal of Educational Development*. 29(3), 241-249. Available through: Lund University Libraries [Accessed 19 March 2012].

Demürger, S., Gurgand, M., Shi, L. and Ximing, Y., 2008. Migrants as second-class workers in urban China? A decomposition analysis. Paris School of Economics Working Paper 20. Available at: <<http://hal-ens.archives-ouvertes.fr/docs/00/58/67/83/PDF/wp200820.pdf>> [Accessed 15 March 2012].

Department of Foreign Affairs of the State Education Commission of the P.R.C., 1997. *General survey of education in China*.

Dongping, Y., 2009. Educational Reform in China: An Overview. In: Y.Dongpoing, ed. 2009. *The China Educational Development Yearbook Volume 1*. The Chinese Academy of Social Sciences. Social Sciences Academic Press and Koninklijke Brill NV: Leiden and Boston, 1-25.

Du, J. and Girma, S., 2007. Finance and Firm Exports in China, *KYKLOS*, 1, 37-54.

Flabbi, L., Paternostro, S. and Tiongson, E.R., 2008. Returns to education in the economic transition: A systematic assessment using comparable data. *Economics of Education Review*. 27(6), 724-740. Available through: Lund University Libraries [Accessed 21 December 2011].

Fleisher, B.M. and Wang, X., 2005. Returns to schooling in China under planning and reform. *Journal of Comparative Economics*. 33, 265-277. Available through: Lund University Libraries [Accessed 21 December 2011].

Fleisher, B.M., Sabirianova, K. and Wang, X., 2005. Returns to skills and the speed of reforms: Evidence from Central and Eastern Europe, China, and Russia. *Journal of Comparative Economics*. 33, 351-370. Available through: Lund University Libraries [Accessed 15 March 2012].

Fleisher, B.M., Li, H., Li, S. and Wang, X., 2005. Sorting, Selection and Transformation of the Return to College Education in China. William Davidson Institute Working Paper 756. Available at: <<http://deepblue.lib.umich.edu/bitstream/2027.42/40142/3/wp756.pdf>> [Accessed 19 March 2012].

Ge, S. and Yang, D., 2011. Labor market developments in China: A neoclassical view. *China Economic Review*. 611-625. Available through: Lund University Libraries [Accessed 27 April 2012].

Griffin, K. and Zhao, R.. Chinese Household Income Project, 1988. ICPSR09836-v2. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2010-07-06. doi:10.3886/ICPSR09836.v2

Groves, T., Hong, Y., McMillan, J. and Naughton, B., 1994. Autonomy and Incentives in Chinese State Enterprises. *The Quarterly Journal of Economics*. 109(1), 183-209.

Gustafsson, B. and Li, S., 2000. Economic Transformation and the gender earnings gap in urban China. *Journal of Population Economics*. 13, 305-329. Available through: Lund University Libraries [Accessed 15 March 2012].

Hannum, E. and Park, A., 2007. Introduction: market reforms and educational opportunity in China. In: E.Hannum and A.Park, A, ed. 2007. *Education and Reform in China*. Routledge: Oxon, 1-25.

Harmon, C., Oosterbeek, H. and Walker, I., 2003. The returns to education: Microeconomics. *Journal of Economic Surveys*. 17(2), 115-155. Available at: <<http://faculty.smu.edu/Millimet/classes/eco7321/papers/harmon%20et%20al%202003.pdf>> [Accessed 21 April 2012].

Hauser, S.M. and Xie, Y., 2005. Temporal and regional variation in earnings inequality: urban China in transition between 1988 and 1995. 34, 44-79. Available through: Lund University Libraries [Accessed 15 March 2012].

Hu, J., 2010. Reforms in Higher Education. A View from China. In: N.Y. Borisenkov. and X.Zhu, ed. 2010. *Educational Reforms in Russia and China at the Turn of the 21st Century: A Comparative Analysis*. Comparative Education Research Centre. The University of Hong Kong: Hong Kong, 44-49.

- Hung, F., 2008. Returns to education and economic transition: an international comparison. *Compare: A Journal of Comparative and International Education*. 38(2), 155-171. Available through: Lund University Libraries [Accessed 28 December 2011].
- Hungerford, T. and Solan, G., 1987. Sheepskin Effects in the Returns to Education. *The Review of Economics and Statistics*.69(1), 175-177. Available through: Lund University Libraries [Accessed 31 March 2012].
- Johnson, E.N. and Chow, G.C., 1997. Rates of Return to Schooling in China. *Pacific Economic Review*, 2:2, 101-113. Available through: Lund University Libraries [Accessed 17 October 2011].
- Knight, J. and Song, L., 2003. Increasing urban wage inequality in China. Extent, elements and evaluation. *Economics of Transition*, 11(4), 597-619. Available through: Lund University Libraries [Accessed 17 October 2011].
- Li, H., 2003. Economic transition and returns to education in China. *Economics of Education Review*. 22, 317-328. Available through: Lund University Libraries [Accessed 14 October 2011].
- Li, H. and Luo, Y., 2004. Reporting Errors, Ability Heterogeneity, and Returns to Schooling in China. *Pacific Economic Review*. 9(3), 191-207. Available through: Lund University Libraries [Accessed 19 March 2012].
- Liu, Z., 1998. Earnings, Education, and Economic Reforms in Urban China. *Economic Development and Cultural Change*, [online] Available at:<<http://www.jstor.org/discover/10.1086/452370?uid=3738984&uid=2&uid=4&sid=55901882993>> [Accessed 15 March 2012].
- Liu, Z., 2010. The External Returns to Education: Evidence from Chinese Cities. In: G.Liu., S.Zhang and Z.Zhang, A, ed. 2010. *Investing in Human Capital for Economic Development in China*. World Scientific: Singapore, 349-377.
- Maurer-Fazio, M., 1999. Earnings and education in China's transition to a market economy: Survey evidence from 1989 and 1992. *China Economic Review*. 10 (1), 17-40. Available through: Lund University Libraries [Accessed 14 October 2011].
- Maurer-Fazio, M., 2007. In books one finds a house of gold: education and labor market outcomes in urban China . In: E.Hannum and A.Park, A, ed. 2007. *Education and Reform in China*. Routledge: Oxon, 224-247.
- Meng, X. and Kidd, M.P., 1997. Labor Market Reform and the Changing Structure of Wage Determination in China's State Sector during the 1980s. *Journal of Comparative Economics*. 25. 403-421. Available through: Lund University Libraries [Accessed 15 March 2012].
- Mincer, J., 1974. Schooling, Experience, and Earnings. National Bureau of Economic Research. Columbia University Press: New York and London.
- Mok, K., 2006. Education Reform and Education Policy in East Asia. Routledge: Oxon.

- Münich, D, Svenjar, J. and Terrell, K., 2005. *The Review of Economics and Statistics*. 87(1), 100-123. Available through: Lund University Libraries [Accessed 25 April 2012].
- Naughton, B., 2007. *The Chinese Economy: Transitions and Growth*. MIT press: Cambridge and London.
- Nee, V., 1989. A Theory of Market Transition: From Redistribution to Markets in State Socialism. *American Sociological Review*. 54(5), 663-681. Available through: Lund University Libraries [Accessed 15 March 2012].
- Neumann, S. and Weiss, A., 1995. On the effects of schooling vintage on experience-earnings profiles: Theory and evidence. *European Economic Review*. 39, 943-955. Available through: Lund University Libraries [Accessed 17 January 2012].
- Pepper, S., 1990. China's Education Reform in the 1980s. Policies, Issues, and Historical Perspectives. Institute of East Asian Studies University of California: Berkeley
- Psacharopoulos, G., 1994. Returns to investment in Education: a global update. *World Development*. 22(9), 1325-1343. Available through: Lund University Libraries [Accessed 16 October 2011].
- Psacharopoulos, G. and Patrinos, H., 2004. Returns to investment in education: a further update. *Education Economics*. 12(2), 111-134. Available through: Lund University Libraries [Accessed 6 December 2011].
- Qian, X. and Smyth. R., 2008. Private returns to investment in education: an empirical study of urban China. *Post-Communist Economics*. 20(4), 483-501. Available through: Lund University Libraries [Accessed 1 April 2012].
- Qiu, T. and Hudson, J., 2010. Private returns to education in urban China. *Econ Change Restruct*, 43,131-150. Available through: Lund University Libraries [Accessed 14 October 2011].
- Qu, Z. and Zhao, Z., 2011. *Wage Inequality of Chinese Rural-Urban Migrants from 2002 to 2007*. Siem Reap, December 3-9, 2011, Poverty & Economic Policy Research Network, 9th general meeting.
- Riskin, C., Zhao, R. and Shi, L. Chinese Household Income Project, 1995. ICPSR03012-v2. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2010-07-28. doi:10.3886/ICPSR03012.v2.
- Rosen, S., 1975. Measuring the Obsolescence of Knowledge. In: F. Thomas Juster, ed. 1975. *Education, Income and Human Behavior*. National Bureau of Economic Research, 199-232. Available at: <<http://www.nber.org/chapters/c3698>> [Accessed 3 January 2012].
- Rosenzweig, M., 1995. Why Are There Returns to Schooling? *The American Economic Review*. 85(2), 153-158. Available through: Lund University Libraries [Accessed 17 January 2012].
- Schultz, T.S. 1961. Investment in Human Capital. *The American Economic Review*. 51(1), 1-17. Available through: Lund University Libraries [Accessed 19 April 2012].

Schultz, T.S. 1975. The Value of the Ability to Deal with Disequilibria. *Journal of Economic Literature*. 13(3), 827-846. Available through: Lund University Libraries [Accessed 15 March 2012].

Shi, L. Chinese Household Income Project 2002. ICPSR21741-v1. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2009-08-14. doi:10.3886/ICPSR21741.v1.

Vujčić, B. and Šošić, V., 2009. Returns to Education and the Changing Role of Credentials in the Croatian Labor Market. *Transition Studies Review*. 16, 189-205. Available through: Lund University Libraries [Accessed 18 April 2012].

World Bank, 1993. *The East Asian Miracle*, The World Bank: Washington D.C., 1-34.

World Bank, 2003. *The Russian Labour Market: Moving from Crisis to Recovery*, The International Bank for Reconstruction and Development/The World Bank: Washington D.C., 1-241.

World Bank, 2006. *China. Governance, Investment Climate, and Harmonious Society: Competitiveness Enhancements for 120 Cities in China*. October. Available at: <http://siteresources.worldbank.org/INTCHINA/Resources/318862-1121421293578/120cities_en.pdf> [Accessed 13 February 2012].

World Bank, 2010. *The Effects of Business Environments on Development. Surveying New Firm-Level Evidence*. Policy Research Working Paper 5402 August. Available at: <<http://wbro.oxfordjournals.org/content/26/2/310.short>> [Accessed 19 February 2012].

Xie, Y. and Hannum, E., 1996. Regional variation in earnings inequality in reform-era urban China. *American Journal of Sociology*. 101(4), 950 – 992. Available through: Lund University Libraries [Accessed 10 October 2011].

Yang, D., 2005. Determinants of schooling returns during transition: Evidence from Chinese cities. *Journal of Comparative Economics*. 33, 244-264. Available through: Lund University Libraries [Accessed 16 March 2012].

Yang, D., 2010. Wages and Returns to Education in Chinese Cities. In: G.Liu., S.Zhang and Z.Zhang, A, ed. 2010. *Investing in Human Capital for Economic Development in China*. World Scientific: Singapore, 327-349.

Yongpo, T., 2009. Employment Issues Facing China's College Graduates. In: Y.Dongpoing, ed. 2009. *The China Educational Development Yearbook Volume 1*. The Chinese Academy of Social Sciences. Social Sciences Academic Press and Koninklijke Brill NV: Leiden and Boston, 163-175.

Zhang, A., Zhang, Y. and Zhao, R., 2001. Impact of Ownership and Competition on the Productivity of Chinese Enterprises. *Journal of Comparative Economics*, 29, 327-346. Available through: Lund University Libraries [Accessed 24 February 2012].

Zhang, J. and Zhao, Y., 2007. Rising returns to schooling in urban China. In: E.Hannum and A.Park, ed. 2007. *Education and Reform in China*. Routledge: Oxon, 248-259.

- Zhang, L. and Yang, Y., 2010. Education Development Strategy. A View from China. In: N.Y. Borisenkov. and X.Zhu, ed. 2010. *Educational Reforms in Russia and China at the Turn of the 21st Century: A Comparative Analysis*. Comparative Education Research Centre. The University of Hong Kong: Hong Kong, 1-7.
- Zhang, J., Zhao, Y., Park, A. and Song, X., 2005. Economic returns to schooling in urban China, 1988 to 2001. *Journal of Comparative Economics*. 33, 730-752.
- Zhang, J. and Zhao, Y., 2007. Rising returns to schooling in urban China. In: E.Hannum and A.Park, A, ed. 2007. *Education and Reform in China*. Routledge: Oxon, 248-260.
- Zhao, W. and Zhou, X., 2002 Institutional Transformation and Returns to Education in Urban China: An Empirical Assessment. *The Future of Market Transition*. 19, 339-375.
- Zhao, W. and Zhou, X., 2007. Returns to education in urban China's transitional economy: reassessment and reconceptualization. In: E.Hannum and A.Park, A, ed. 2007. *Education and Reform in China*. Routledge: Oxon, 224-247.
- Zhong, Q. and Li, Z., 2010. Reform of Educational Content. A view from China. In: N.Y. Borisenkov. and X.Zhu, ed. 2010. *Educational Reforms in Russia and China at the Turn of the 21st Century: A Comparative Analysis*. Comparative Education Research Centre. The University of Hong Kong: Hong Kong, 35-44.
- Zhou, X., 2000. Economic Transformation and Income Inequality in Urban China: Evidence from Panel Data. *American Journal of Sociology*. 105(4), 1135-1174. Available through: Lund University Libraries [Accessed 14 April 2012].
- Zhourakovskiy, V.M., 2010. Reforms in Higher Education. A view from Russia. In: N.Y. Borisenkov. and X.Zhu, ed. 2010. *Educational Reforms in Russia and China at the Turn of the 21st Century: A Comparative Analysis*. Comparative Education Research Centre. The University of Hong Kong: Hong Kong, 44-50.