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**HUMAN RESOURCES IN CHINA:  
THE BIRTH QUOTA, RETURNS TO SCHOOLING,  
AND MIGRATION**

**T. Paul Schultz**

Yale University

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# **Human Resources in China: the Birth Quota, Returns to Schooling, and Migration**

**T. Paul Schultz**

## *Abstract*

Rural elderly have 40% of the income of those in urban areas, spend a larger share of their income on food, are in worse health, work later into their lives, and depend more on their children, lacking pensions and public services. The birth quota since 1980 has particularly restricted the childbearing of rural less educated women, who now face retirement with fewer children for support. Inequality in China is also be traced to increasing returns to schooling , especially beyond secondary school. Government restrictions on rural-urban migration reduces national efficiency, adds to the urban-rural wage gap, and increases inequality.

Keywords: Human Capital Returns, Rural-Urban Migration, Elderly Poverty, China

JEL Classification : J13 , J24, J14

## 1. Introduction

Chinese economic growth since the mid 1970s is impressive by world standards (Maddison 1998; Johnson, 1990). My objective is to examine the policies and institutions that may have fostered or inhibited that growth, related to the efficient and equitable production and utilization of human resources. This will involve first a consideration of China's population policies, which have taken a unique form in response to this century's opportunities to improve health. The second issue involves social and private investments in reproducible human capital, or investments in the capacities of the Chinese populations to be productive during their increasingly long, healthier lives. The individual, family, and society requires information on how large the private and social returns are to investments in schooling, health, labor mobility, and on-the-job training, and the state should assess how it can help local communities and families invest in the highest return activities available to them, while dismantling restrictions on individual behavior which restrict people from realizing these returns.

In addition to efficiency achieved by promoting the formation of human capital that promise to earn the highest return on private and public resources, and thus advance individual incomes as well as aggregate economic growth, society also values less inequality in the distribution of national income. Inequalities are basically of two types: those which serve an allocative function to achieve a higher rate of economic growth, and those that do not facilitate more rapid growth. Sources of inequality which are not associated with incentives and institutions promoting growth should be evaluated and if possible eliminated or counterbalanced by targeted remedies. It may be desirable to go still further and sacrifice some growth in order to reduce current and accumulating inequalities, by such measures as progressive personal taxation and welfare transfer schemes which are designed to minimize disincentive on effort and growth. In these instances the tradeoffs between growth and equality should be clarified to assure that these complex choices are well informed, openly debated, and transparently implemented.

I will present evidence that the returns to human capital have become larger in Chinese agriculture after 1979, as the rural organizational reforms spread throughout the country, and are today more broadly reflected in the structure of wages received in the rural (Township-Village-Enterprises: TVE) industries. Returns to schooling are also increasingly evident in the expanding urban economy. These growing returns to human capital add to inequality, but also promise to improve the allocation of labor, promote innovation, and encourage families and communities to sacrifice current resources to invest in the formation of larger supplies of valuable human skills for the future. Similarly, interregional differences in wages are large in China, signaling returns to migration are substantial. However, if labor mobility is restricted by government regulations and channeled into short-term migration, which causes a reduction in complementary investments in on-the-job training and schooling in rural areas, these may be costly market failures. Recently, there are tentative signs that the new Chinese government may relax its limits on rural-urban migration and assign a higher priority to alleviating poverty in the rural interior areas of China. But initiatives in these areas will be undertaken with the hopes of not raising urban unemployment in the old industrial cities where state firms need to trim employment. Other sources of inequality which do not improve the allocation of resources should be reassessed. The development of new institutions and social arrangements may be needed to address some of these inequalities and provide individuals, firms, and government with opportunities and incentives to improve the allocation of resources.

This paper is divided into three more sections. Section two deals with population growth, the Chinese response of a “birth quota”, and its implications for efficiency and equity. Section three considers empirical evidence of returns to education and other wage differentials in and between rural and urban labor markets. Section four briefly concludes by identifying problems and priorities that could help China realize its ambitions for growth and diminished inequalities.

## 2. Population Growth, Economic Development, and Birth Quotas

The reduction in age-specific mortality in China after the end of the Second World War and subsequent Civil War was exceptionally rapid, particularly among infants and young children, and it is plausibly attributed in part to an egalitarian distribution of available food and widespread control and treatment of infectious disease (Prescott and Jamison, 1985). Life expectancy at birth increased in China from about 38 years in 1950, to 64 years in 1978, marred by the politically exacerbated famine of 1959-1961 (Johnson, 1998), and then continued to grow to 69 years by 1995. This nearly doubling of the duration of life is a remarkable achievement for a country with China's level of income (Maddison, 1989; Table 3.6). As a direct consequence of this success in improving health, the annual rate of population growth of China, which was about 1.3 percent per year in the period 1945 to 1955, increased to 3.2 percent per year between 1965 and 1970 (Maddison, 1998; Table D-1).

Political indecisiveness as to how a socialist state should react to this increase in the rate of population growth ended in 1979, when China announced its one-child family policy. The one-child policy was relaxed in 1984 in Document No.7 of the Central Government, in which rural couples whose first child was a girl were allowed to have a second birth in most parts of China. Indeed, in six provinces of Guangdong, Hainan, Yunnan, Ningxia, and Xingjian, all rural couples were officially allowed to have two children (Schultz and Zeng, 1999). The modest rise in birth rates in 1985-87 is associated with the concurrent liberalization in the marriage laws that led to more first births among younger women, rather than an increase in births of a higher birth order, as might be expected if the rise in fertility were due to a relaxation of family size quotas. Although many low-income countries in addition to China have experienced a decline in their total fertility rates from 6 children per woman to 2 or 3 children in a period of two or three decades, no other country has adopted China's solution of imposing quotas on births. What is the economic rationale for a state to curb population growth by means of quantitative restrictions on fertility ?

There is little consensus on the causal forces which improved world health conditions and reduced mortality, and what combination of factors subsequently reduced fertility and slowed population growth rates. When a panel of economists and demographers examined the argument that rapid population growth was a deterrent to growth in per capita income, they could not find scientific support for this widely held belief (National Academy of Sciences, 1986). The arguments linking population growth to slower growth in per capita income are systematically reexamined and rejected by D. Gale Johnson (1999) several years ago. There is little empirical support for the hypothesis that increases in child survival are associated with decreases in savings or investment rates, as assumed by Coale and Hoover (1958) in their early demographic economic simulations for India. Some East Asian countries did subsequently increase their household savings rates while fertility declined in the 1960s and 1970s (Higgins and Williamson, 1987). Other regions, however, such as Latin America, experienced comparable declines in total fertility but experienced no major increase in savings or economic growth. There are correlations across countries in some regions, and in some time periods, between changes in age structure of the population and more rapid growth in per capita income. These inter-country associations might be explained by the fact that a growing share of the population in countries that reduce their fertility are in age groups who participate most frequently in the labor force. In addition, with a reduction in fertility the proportion of women's adult lifetime allocated to working outside of the home tends to increase as they allocate less time to child care, adding further to growth in labor force. The country-level correlations between the age composition and its income growth could be due to these or other omitted factors, such as women's increasing education relative to men's (Schultz, 1994). It is hard to discriminate among these mechanisms, but as Johnson (1999) articulated with specific reference to China – moderate rates of population growth, between 2 to 0 percent per year, have not been causally linked to slower (or more rapid) rates of economic growth. Even in a country that is as densely populated and poor as China was in the 1980s, there appears to be no scientific basis for encouraging lower fertility or slower population growth in order to promote economic development.

What other reasons might the state invoke to justify a population policy? There is an argument for providing family planning information and services to private citizens to help them have the number of births they want and time those births optimally over an individual's life cycle. Given the rate of improvement in child survival in many low-income countries, new generations of parents confront very different lifetime opportunities. The most promising options for their lives, and those of their children, may change with the extension of information about new technologies. To assess the reliability and risks associated with different modern birth control technologies, a public health extension service can usefully diffuse information. In the case of agriculture, where family farms are small, the government has an economic justification for subsidizing the production of new (agricultural) technology and the diffusion of best practices at low marginal cost through farm extension services. For parallel reasons, there is a justification for governments to subsidize the diffusion of best practices in the area of family planning. However, going further and setting a birth quotas is an unprecedented policy, which is not now justified by a consensus of economic or demographic research.

There are instances where the state is already subsidizing children, and may wish to modify this policy. However, it would not seem prudent to extend this logic to recouping the entire public costs of providing children with health care and education, for most of the returns to human capital are realized by the children, or in other words, the next generation in the society. Most evidence suggests these human capital investments have high social as well as private returns. Societies have traditionally viewed health and educational investments in children as public goods, which are encouraged for all social and economic classes if the social returns are high. The mechanism providing encouragement is also designed, where possible, to reduce the inequality in health and schooling within a birth cohort.

One possibly reason for the Chinese government to adopted a birth quota was to compensate for the government's failure to initiate a voluntary family planning program in the 1960s and 1970s, when many other East Asian countries were extending family planning services through the public sector. However, this quota policy is not likely to impose the same cost on all people. It is not easy to determine

whose fertility is “capped” by the quota policy and whose is least affected by this policy. The private costs of the birth quota are paid, in terms of welfare losses, by those who would find it in their own private interests to have more than the allowed number of children. Viewed thus as a tax on the population, the burden of this tax is proportionately regressive, imposing higher opportunity costs on the rural poor relative to their incomes, than on the urban rich relative to their incomes. Also, since the penalties for a birth in excess of the quota (out of plan) are generally set in fixed monetary terms by local governments, this “fixed price” for an “out of plan” birth will not discourage the rich from having an additional child as much as it will the poor. However, other penalties may be more progressive in their impacts, such as loss of employment for the parents, loss of priority for public housing, or failure to register the child for public schooling, all of which could represent a larger financial penalty for the rich than for the poor. Nonetheless, in rural areas where private demands for fertility are most likely to exceed the quota, the principal penalty for self-employed farmers is probably the fixed fine, unless the farmer is sufficiently poor and has no assets with which to pay the fine.

It is hard to imagine how one could infer how people would behave ( i.e. their hypothetical fertility) if the legal system they lived under did or did not restrict such behavior. However, as a guide, studies in various countries find regardless of whether voluntary family planning services are provided by the public, better educated women who are able to earn a higher wage in the labor market tend to have fewer children. Economists are inclined to interpret this widespread relationship between female education and reduced fertility as support for their hypothesis that fertility is partly determined by economic rational motives – and when the value of a mother’s time increases, the private opportunity costs of having a child increases, and fertility tends to decline (Becker, 1981: Schultz and Zeng, 1995). In addition, a woman’s education tends to be related to her knowledge of birth control, and the time it takes her to identify and adopt a beneficial technological innovation, such as a new form of birth control. Thus, her education may reduce her cost of using effectively birth control and thereby reduce her unwanted fertility. A mother’s education may also reduce the amount of her time required to educate her children,

and this would enhance her expected rate of return in investing in the education of her children, and lower her reproductive goals (Schultz , 1997).

Many empirical analyses of reproductive behavior in low-income and high-income countries confirm that parents behave as if the number of children (quantity) they have is a substitute in their consumption for the schooling and health (quality) investments they make in each of their children. This tradeoff of quality for quantity on the part of parents is linked by Becker and Lewis (1974) to the modern demographic transition. Exploiting a natural experiment of “twins” as an unplanned or accidental extra birth, Rosenzweig and Wolpin (1980) show (in rural India in 1969-71) an “extra” twin is associated with a woman having 0.8 more births at the time of the survey, which is consistent with birth control being imperfect or costly, and some of the pregnancies that produced twins would otherwise have been the woman’s last birth. The substitution of child quantity for quality is then estimated by the cross-effect of the occurrence of a twin on the schooling of the parents’ other children. The negative sign estimated for this partial relationship between an uncontrolled change in the fertility supply on the demand for schooling is indirect evidence that quantity and quality are viewed by parents as substitutes. In the Chinese context, these investigations suggest that the impact of a birth quota would be the opposite to that due to twins, and could force Chinese parents to increase their income-compensated demand for education of their remaining children, if their loss in income or utility associated with the imposition of the quota did not dominate their net cross-substitution effect (Schultz, 1997).

Others have analyzed the consequences of social experiments providing family planning services to randomly selected villages in low-income countries to estimate first how much the random family planning services helped the “treated” woman reduce her fertility, and second, how much the exposure to the family planning program treatment affects the schooling of the woman’s children. Foster and Roy (1992) concluded that in an experimental family planning program in rural Bangladesh started in 1977/1978, the primary mechanism by which the family planning program effected educational attainment

of the women's children operates through a reduction in the number of pre-school children in the household.

Another characteristic of couples who voluntarily demand more children is that they work in a situation where unskilled child labor has a greater productive value in the family, or the inputs to rearing children are cheaper, or both. Rural-agricultural households in low-income countries which tend to have a range of chores that children can readily perform, such as herding livestock, often report greater fertility. In most parts of the world, holding constant for the mother's and father's education, those engaged in agriculture tend to have larger families (Schultz, 1997). Conversely, the high cost of adding to a family's housing in Chinese cities may deter most urban couples from wanting a second child.

If there were an economic reason to invest social resources to encourage lower fertility than would prevail with only a *voluntary* family planning policy, what alternative programs or policies might accomplish the same consequence as the birth quota, and yet be less inequitable? The schooling of girls is still lagging behind that of boys in the poor rural interior areas of China (Knight and Shi, 1996). A subsidy for girls to attend school or for rural schools in poorer areas should have the effect of encouraging parents to substitute the schooling of their children for having more children. In other words, relying on the symmetry of the quality-quantity income compensated substitution effect described earlier, a subsidy for parents to invest more in their children's schooling would effectively reduce fertility among poor rural families (Rosenzweig and Wolpin, 1980, 1982) and accomplish the effect of the birth quota on the quantity and quality of children.

A frequently mentioned reason for having more children in many traditional societies, such as China, is to have more boys for security and support of the parents in old age. The government of China has provided urban state employees with pensions, weakening urban demands for large families. The government prohibition of private land ownership strengthens the relative demands of rural parents for more children, and for sons in particular. The hypothesized motivation relies on a lack of alternative

investment instruments which could substitute for children by transferring consumption over the life cycle or permit parents to buy old age insurance (Zhang and Nishamura, 1993).

The unattractive distributional consequences of the birth quota in China is made worse by the recent decentralization of government finances following in the wake of the economic reforms. Rural women who might have been about 30 in 1980 and told to have no additional births will in 2003 be 54 and approaching retirement without those extra children to support them and care for them. If they lived in the city they might receive locally provided health care and even a pension ( See later Table 1 and section 3.4). In the rural sector, pensions are rare and medical services which were provided in many communities through the collective farm have been terminated or privatized. Welfare services at the county and township level now rely primarily on local taxes, and with fiscal decentralization they are no longer subsidized by the central government. Taxes on local industry may also support welfare programs for the elderly, but this tax base is disproportionately concentrated in the high-income coastal provinces (West and Wong, 1995; Wong and Woo 1995). If China cannot yet afford a pension for its rural elderly, the consequences of its birth quota will soon become even more salient as elderly rural women and men retire with few, if any, children to support them.

### **3. Human Resource Investments and Returns**

China emphasized first universal primary and widespread secondary schooling, and more recently expanded higher education. Data from UNESCO and the China Statistical Yearbooks indicate primary and secondary educational enrollment rates increased rapidly after 1949. However, higher education enrollments and specialized secondary education enrollments collapsed at the end of the 1960s during the Cultural Revolution. To compare China with other countries, Maddison's (1998) estimates "primary equivalent" years of education, which increased for China from 1.6 "equivalent years" in 1950, to 4.1 years in 1973, to 8.5 years in 1992. Chinese educational attainment has increased marginally from somewhat less than half the level of Korea and Taiwan in 1950, to about 60 percent of these countries by

1992. The population of China had 1.2 times the educational attainment of India in 1950, according to Maddison's estimate, and this advantage widened to 1.8 times India's education by 1992. Many surveys show growth of enrollments in the 1980s and 1990s, though dropout rates from secondary schools continue to be substantial in rural areas, particularly among girls (West and Wong, 1995; Knight and Shi, 1996).

With the size and diversity of China, most studies of the labor market shed light on the levels of and returns<sup>1</sup> to human capital in only a few provinces, and then generally the samples are drawn only from the urban or rural population. It is unclear how representative these observed wage patterns are for the entire nation. Self-employed farmers represent most of the rural labor force today, making it is difficult to measure the productivity of self employed family labor. Estimates of wage functions in rural areas do not generally attempt to correct for the potential sample selection bias introduced by analyzing only the small share of rural wage earners and excluding self employed and family workers. For example, Meng (1998) notes that the lack of wage returns to college graduates in her rural industry survey is probably due to the fact that most college educated rural youth can qualify for an urban job, and those who stay behind in rural industries are probably less motivated and less productive than those who have migrated out of the rural sample. These limitations of available evidence on the wage labor market will not be resolved until nationally representative random samples of the labor force and population are collected over time for all of China, and a reliable strategy is developed for dealing with the selectivity of wage earning samples.

### **3.1 Rural Labor Market**

Household surveys or censuses that include information on wages and worker characteristics, including their human capital, are not widely available for China before the 1980s. When these types of data are available, they suggest education earns a wage premium for Chinese workers, although the percentage gains in wages per year of schooling completed by the worker are relatively modest for a

country with China's low educational attainment. Differences in wages between men and women within an education/age group are also relatively modest for a low-income country. Is this a consequence of China's egalitarian institutions or a reflection of a relatively large supply of educated workers compared with the derived demand of employers for educated workers? In other words, will integrating the Chinese labor market and allowing it to operate more competitively raise the returns for the educated worker, or is the supply of educated workers currently adequate for the Chinese Economy?

The agricultural reforms which ushered in the Household Responsibility System spread rapidly across China from 1978 to 1982 (See figure 2, Schultz and Zeng, 1999), and were associated with increased off-farm rural employment and gradually increasing rural-urban migration ( Johnson, 1990, 1994, 1999; deBraw, et al, 2002). Farm management and production surveys have been used to estimate agricultural production functions, from which the marginal product of labor can be inferred, but they do not typically disaggregate labor inputs (by education, age, and sex) to allow one to infer the implicit wage structure in agriculture. One exception is Li and Zhang (1998) that contrasts how work points and wage payments varied in collectivized production teams in Wugong village of Hebei province in 1977, and how post-reform household incomes varied by the characteristics of the household's workers in Sichuan province in 1990. They find the production team did not assign a wage premium to educated labor, although males, older workers, and married males do receive higher wages than do other workers. In contrast, in 1990 agricultural households have higher farm incomes if the education of the head or the average education of family workers is higher. This finding suggests that human capital has a return to Chinese farmers today, as it does in most other countries where such data have been analyzed (Schultz, 1988), and that the economic incentive for rural youth to acquire schooling has increased with the introduction of the Household Responsibility System. Other investigations of household production in agriculture confirm agricultural incomes tend to be higher for the better educated farm families, providing significant though modest returns to those who have invested their time and family resources in continued schooling (Yang, 1997b).

Much of the return to schooling in rural areas is realized by better educated individuals migrating to higher wage labor markets, which are often in urban areas (Schultz, 1988). Restrictions on permanent migration in China reduces the returns that rural youth can expect to realize through profitably moving to a higher wage labor market. The household registration system has thus curbed mobility and reduced the incentives for the rural population to invest in more schooling, while it has raised the returns to schooling in the urban areas where the rural born are unable to migrate and establish a permanent residence. Restrictions on rural-urban mobility in China has the effect of increasing the gap in educational investment between rural and urban families (Knight and Shi, 1996), widening the wage gap between rural and urban labor markets, and raising overall wage inequality by increasing the relatively high urban wages for educated skilled labor.

Xin Meng (1998) analyzed the structure of wages in rural townships, villages, and privately-owned enterprises in 1986 and 1987 in four counties with different degrees of industrialization and ownership structures. Daily wage functions are estimated separately for men and women in competitive markets ( i.e. private market-oriented firms) and less competitive firms ( i.e. public state-controlled ). In the private firms wages are 3.9 percent higher for male workers with an additional year of schooling (average is 8.9 years of education), and 3.2 percent higher for female workers (average 8.3 years of education). In state firms, however, better educated rural workers do not receive systematically higher wages, and even tenure in the job, which is associated with higher wages in private firms, is unrelated to wages in state firms (Xin Meng, 1998). It is assumed that the economic reforms have contributed to the expansion of employment in the private market-oriented firms as the reforms have reduced growth in employment in state firms (Khan et al., 1998). With the passage of time, it may be expected, therefore, for these shifts in sectoral composition of employment to increase the average wage returns to schooling in the rural labor market of China.

### 3.2 Urban Labor Markets

In the urban economy studies of the labor market have documented gradually increasing private wage returns to education (Schultz, 2000). Byron and Manatoto (1990) estimate from a 1986 Nanjing market research sample that wage returns are about 3.7 percent per year of schooling. Women receive wages that are 9 percent less than men, holding constant for the workers' schooling and post-schooling years of experience. Based on a 1989/1991/1993 panel survey from the China Economic Health and Nutrition Survey collected in 8 provinces, wage returns were significant, tending to be about 2 percent per year of schooling for men and 4 percent for women, rising slightly over this four year period (Subramaniam, 1997). Women employed in urban areas in state enterprises receive lower wages than they do in the private sector, controlling for schooling, experience and province, whereas returns to schooling for both sexes tend to be larger in poorer provinces where average educational levels are lower. The gender wage gap is 15 percent after holding constant observed worker productive characteristics. The Survey of Income Distribution in 1995 conducted in 11 provinces reported somewhat larger returns to schooling, and although women's wages tended to be 15-20 percent lower than men's, women's percentage wage returns to schooling are higher than men's (Moktan and Subramaniam, 1998).

The State Statistical Bureau's urban household surveys from three provinces (Guangdong, Sichuan, and Hunan) have been used to estimate the wage structures for 1986/87, two years at the start of this survey, and seven years later in 1993/94 (Schultz and Yu, 1998a, Tables 2,4,5). Based on wage earners age 15 to 59, the increment to log earnings associated with an additional year of education is the Mincer (1974) approximation for the private internal rate of return that a student and her family might expect to earn on the investment of the student's opportunity cost of time attending school, log wages rather than working. Women's absolute level of wages in these three provinces was 17 percent below men's wage level in 1986, and 22 percent below men's wage by 1994. The wage returns associated with schooling are, again, consistently higher for women than for men, an empirical regularity often observed in countries where women have obtained less schooling than men (Schultz, 1995). The gender gap in

wages, after controlling for the workers education and age, has also been growing in China, even though it remains relatively modest by international standards, 5 to 20 percent (Moktan and Subramaniam, 1998). Wage returns appear precisely defined in these cross sectional samples, according to the ratio of the schooling return coefficient divided by its standard error. However, there is substantial year-to-year variation in the point estimate of the return to schooling, which probably reflects sampling variability, as well as some actual year-to-year changes in wage structures. Returns tend to increase for men over this eight year period from 3.5 to 5.8 percent, and for women from 5.4 to 8.4 percent, respectively. By the end of the period, returns are higher in Hunan and Sichuan than in Guangdong. Coastal regions experienced the more rapid growth in wages, reflected by Guangdong in this study, but schooling returns tend to be lower in this province, which has a greater supply of better educated workers than the other two provinces. In 1985 the wage level in Guangdong Province was 30% higher than those prevailing in the other two provinces, and by 1995 this interprovincial wage gap had increased to 70 percent, (Schultz and Yu, 1988a), another indication of the increasing potential returns to migration, if it were not restricted by the registration system.

The wage function can also be specified to allow the logarithm of the monthly wage to differ by each level of schooling as reported categorically in the survey. This specification of the wage function avoids the need to impose log-linearity in the effect of years of schooling on the wage or attribute the number of years completed to those who do not finish a specific level of schooling (Schultz and Yu, 1998a, Tables A-7). Workers with a junior middle school level of education received wages that were not significantly higher than those with a primary or less education, and these wage returns to junior middle school do not appear to grow systematically from 1986 to 1994. Male workers with a senior middle school education receive a 15 percent wage advantage over the primary educated, and women receive a 25-35 percent wage premium, respectively. For urban workers who have some college education, their wage premium over the primary educated is large and growing, for men from 30 percent to 51 percent in 1986 to 1994, and for women from 52 to 83 percent in the same years. If it requires four years of

enrollment to advance from senior middle school to the college and more, the estimated wage gain for women was about 11 percent per year enrolled by 1994, and these college returns were only 5.8 percent in 1986, or half as large. For men the comparable college returns also doubled in these eight years, from 4.5 to 9.3 percent per year enrolled.

These estimates of the returns to school level have been corrected for the possible bias introduced by the systematic selection of persons into the urban wage labor force. To correct for the selectivity of the sample of wage earners, correction must be made for who enters the wage labor force and who does not, i.e. variables identify the selection model which are assumed do not affect the wage a worker might expect to receive in the wage labor force (Schultz, 1995). In these data the most appropriate variables that might raise the individual's marginal utility in nonwage work are indicators of wealth: property rights in the residence, gift income, income from sale of assets, and other unearned income. These variables suggest that those who are especially inclined to work in the wage labor force because they lack these nonearned incomes are also more likely to receive for unobserved reasons lower wages when they do work for wages. However, this systematic selection of wage earners does not impart a noticeable bias to the estimated rates of return to schooling (Schultz and Yu, 1998a).

The level of real wages, adjusted for changes in the consumer price index, appears to have grown about 37 percent for men in this 8 year period and by 29 percent for women. More notable is the increase in the variance of the logarithms of monthly earnings, which is a commonly cited, if volatile, measure of the inequality of earnings. The variance of log wages for men was .18 in 1986 or relatively low, and had reached the level of .64 by 1994, whereas for women workers the increase in variance of log wages was from .23 to .82 in the same time period. In addition to the nearly doubling of the relative wage return of education, there has been a larger increase in the residual variance that is not explained by the conventional indicators of skills, education, and post-schooling experience (Schultz and Yu, 1989a).

Gustafsson and Li (1998, 2000) have also analyzed Urban Household Income Surveys collected by the Institute of Economics of the Chinese Academy of Social Sciences based on a SSB urban sample

for ten provinces for 1988 and 1995.<sup>2</sup> They report log monthly wage functions by sex, but they include control variables for characteristics of jobs for which education and age might qualify an individual, such as occupation, type of job in terms of supervisory authority, industry, temporary worker, and type of ownership of the firm. Consequently, the partial correlations they report with age and education are difficult to compare with other studies, because they are estimated after conditioning on many characteristics of the skill requirements of the job. They report that wage differentials associated with education tend to widen from 1988 to 1995, and percentage wage differentials in wages by education are larger for women than for men. The unadjusted difference in wages between men and women increases from 17 to 22 percent. For the four-year college graduate male wages were about 10 percent higher than a middle school graduate in 1988, suggesting a 2.5 percent return per year of school attended. This adjusted wage differential had grown to 15 percent seven years later, implying a return per year of college education of 3.8 percent, after controlling for the noted job characteristics. For women, college educated workers earned 10 percent more in 1988, and 21 percent more in 1995, conditional on job characteristics. The average wage of women is about 25 percent less than that of men with only a primary level of education, but is 9 to 11 percent less than men with 2 years of college. In other words, the percentage earnings returns to education are also larger for women than for men after conditioning on a variety of job characteristics..

Gustafsson and Li (1988) find that wage levels are 30-40 percent higher for workers in foreign and joint venture firms than in collective enterprises, which are only slightly below other public enterprises, and wages are 15-30 percent higher in state firms than in collective and public enterprises. The share of temporary workers in the urban labor force is increasing from one percent in 1988 to nearly 3 percent in 1995, and the share is larger for females than males. In 1988, male temporary workers received .24 log points less than permanent workers (27 percent) holding other factors constant, whereas female temporary worker received .48 log points less than permanent workers (62 percent). Negative wage differentials of these temporary workers declined by half over this seven year period, to .14 and .22 log

points by 1995, for men and women respectively. This indicates the temporary/permanent worker markets are becoming less segmented over time as the share of temporary workers in urban areas has increased. As other urban surveys confirm, the level of real wages increased from 1988 to 1995, by 47 percent in this sample, while inequality in monthly wages, measured in this study by the Gini coefficient (scaled x100) , increased by 24 percent, from 23.3 to 28.9. (Gustafsson and Li, 1998).

The most recent estimates of urban wage returns to years of schooling are reported by Zhang and Zhao (2002) from the State Statistical Bureau's urban sample of six cities and provinces (i.e. Beijing, Liaoning, Zhejiang, Sichuan, Guangdong, and Shaanxi), based on real monthly earnings for employees age 16 to 60, separately in each year from 1988 to 1999. Estimating Mincer's (1974) specification of the log earnings equation which controls only for a quadratic in post-schooling experience and city or province, the coefficient on years of schooling increases from 3.2 to 9.2 percent for males from 1988 to 1999, and from 6.1 to 15.0 percent for females (Zhang and Zhao, 2002, Table 8). They find the return to schooling is relatively stable at the junior high school over primary school levels, but increases at more advanced levels of education, especially in the 1990s at technical and college levels. The urban wage returns to schooling increased more among cohorts born more recently, confirming the growing economic scarcity of better educated younger workers trained in the period since the Cultural Revolution. Across the six regions, those provinces with a larger proportion (supply) of better educated workers record lower returns to schooling. The changing composition of urban jobs by type of employment is also reported from 1988 to 1999, showing the contraction of collectively owned enterprises from 24 to 14 percent of the employment, a later slower contraction in employment by state units after 1995 from 79 to 74 percent, and the sharp increase in the share employed by "other ownership enterprises" (e.g. private, foreign funded, share-holding enterprises, and self-employed) from 1.2 to 11 percent, occurring mostly after 1991 (Zhang and Zhao, 2002, Table 3).

In sum, recent urban labor market studies of China consistently report several regularities in wage structures. Regional wage differences are growing wider, wage returns to schooling above the junior

secondary school level are increasing, and returns to age or post-school experience appear in the cross-section to be diminishing or the young are gaining ground. These empirical regularities are noted in many countries moving from centrally-planned to market-oriented economies (Schultz, 2000). More distinctive to China at the start of the reform is the low level of returns to schooling and the relatively small (5-15 percent) gender wage gap, controlling for education and experience. The gender wage gap has increased more recently and the wage returns to obtaining more schooling remain consistently higher for women than for men in the urban Chinese labor market.

### **3.3 Rural-Urban Wage Differentials and Migration**

The gap in wage levels between urban and rural areas of China has been estimated as 2.4 to 1.0 (Griffin and Zhao, 1993; Rozelle, 1994), which is larger than observed in most low-income countries at an early stage in their development. Although the urban-rural wage gap may have declined somewhat in China in the 1980s after the agricultural reforms when the price of agricultural output increased, the urban-rural wage gap has probably widened again in the 1990s (Jian et al , 1996). This large difference between urban and rural incomes in China contrasts with the egalitarian doctrine justifying the early land reform and collectivization of agriculture. Part of this gap can be attributed to different levels of human capital and skills in the two sectors, and to the vast size of China and the high transportation costs. However, an urban bias in labor market policy has restrained rural to urban migration and other forms of intersectoral adjustment. Collectivized agricultural institutions provided weak incentives to allocate time and effort efficiently at the individual level, contributing to the stagnation in agricultural output in the 1970s (Johnson, 1990). Government controls to curb rural-urban migration have been relaxed with the agricultural reforms starting in 1979, allowing first for intra-rural migration to township-village-industries which fueled growth in rural nonagricultural employment. Urban consumer food subsidies (i.e., food rations) for legal residents have become less effective in halting migration to the cities as a larger share of food moves through free markets. There are still a series of arrangements registering households

(Houkou) that restrain the efficient adjustment of intersectoral labor markets, and these are probably the most costly distortion in the Chinese economy today.

Family migration from the countryside to the city is costly because there is only a thin private market in urban housing, with most housing provided by an employer as in-kind source of income linked to a job. Rural immigrants with sufficient education may be able to locate a good urban job and satisfy the regulations to move, but for the less educated in rural areas, the only way to migrate may be as part of a contract labor group, or classified as a temporary worker. Single persons are then used for physical labor and neither the employer nor the worker has an economic incentive for the worker to learn additional skills or gain on-the-job training to qualify for a better job. The temporary and seasonal migrant cannot expect to accumulate the relevant skills which a permanent migrant would acquire to advance his career in the urban sector. Thus, the legal barriers to permanent migration contributes to an under-investment in on-the-job training among illegal and temporary migrants to Chinese cities.

A major factor underlying the urban-rural wage gap is the difference in years and quality of education of urban and rural workers. Knight and Shi (1996) examine the 1988 national household sample survey<sup>3</sup> and report that rural residents have 4.6 fewer years of schooling than urban residents. With a 5 percent return on schooling as noted earlier, this gap in education could explain directly only about a 25 percentage points of the sectoral difference in wage rates. Differences in nutrition and health could also be an important factor, for even with the egalitarian health and food-sharing institutions of China, there are still large differences in child height and weight standardized for the child's age which suggest widespread rural malnutrition in the interior provinces that are likely to stunt adult physical growth and contribute to the early development of chronic illnesses, which reduce individual productivity (Shen, et al. 1996). In a sample of seven provinces rural-urban differences in child physical growth and development diminished somewhat after the rural reforms, from 1975 to 1985, but grew larger from 1987 to 1992 (Shen, et al. 1996). It is often hypothesized that child nutritional status complements investments in

schooling, and it has been reported that malnourished school children perform less adequately in schools in China (Jamison, 1986) and elsewhere (Glewwe and Jacoby, 1995).

The long-term improvements in health that occur with economic development are closely associated with the growth in average adult health and height (Fogel, 1994; Schultz and Tansel, 1997). In an analysis of the China Health and Nutrition Survey, Yan (1999) observed an increase in adult height of about .15 centimeter per year from 1945 to 1960, but much slower growth in height after the recovery from the famine of 1959-61.<sup>4</sup> The variance in adult height in China may have increased over time, providing another potential factor contributing to the rural-urban wage gap. The socially predictable variation in height can be interpreted as a form of health human capital, and an additional centimeter of predicted adult height is associated with a five to ten percent increment in wages (Schultz, 1999, 2002).

The household responsibility system, which replaced the collectives in agriculture during the years 1979 to 1983, left the farmer with an allotment of land and an obligation, at least initially, to sell a specified amount of agricultural output to the state at fixed prices. The land allotment is subject to reallocation periodically by local government authorities. Johnson (1990) argues that the length of the land contract of the government with the farmer is about seven years, and this is too short to encourage the farm household to invest optimally in improving the land and maximizing the productivity of all fixed and variable inputs used in agriculture (Feder, et al. 1992). Moreover, for farmers approaching the end of their land contracts, the expectation that they will be assigned different land in the village within a few years could sharply reduce their incentive to improve the productive potential of the land through investments in drainage, fertilizers with persistent effects, and even weed control. Moreover, the contract with the government for “use of the land” may be abrogated if the family neglects the land, and the capital value of the contract for the land would be lost entirely if too many members of the household migrate. As a consequence, to keep control of the land, the farm household can only allow selected family members to migrate in search of better employment, perhaps only during the slack season when agricultural labor requirements are low. As labor productivity in urban areas continues to increase,

probably more rapidly than in agriculture, labor should be reallocated from agriculture to work in more productive sectors of the economy. However, the Chinese arrangements controlling property rights in land prevent this from occurring in an efficient manner (Yang, 1997a). Similar communal institutions controlling property rights in land have in the past retarded the out migration of labor and capital during industrialization, such as in Russia (e.g. Mir) and Mexico (ejidos). Barriers to competitive land markets prevent smaller agricultural units from being consolidated, when new technology increases the economies of scale. It also forecloses one of the few means the elderly have in agriculture to accumulate an asset which could provide them with a means to support their consumption and health care needs in old age, as previously noted. Certainly, the lack of a market in land makes the importance of children, and sons in particular, all the stronger in rural China, and may underlie the greater neglect and mortality of infant girls than boys, and the use of ultra-sound diagnostic tests to abort selectively female fetuses in the rural areas of China's poorest provinces.

Migration can also be viewed as an equilibrating mechanism to reduce inequality in wages. In most populations, the probability of migration increases with the education of the individual (Schultz, 1988). This may be explained by the ability of the more educated to assess the relevant risks and process the information required to migrate at less cost than is possible for the less educated potential migrant. Migration may also be a human capital investment that is easier for relatively rich families to finance, through borrowing against their other collateral resources. It is common, therefore, to observe a larger ratio of wages between educated and uneducated workers in the lower-income regions of a country, i.e. greater returns to schooling. The relatively rich families in poor rural regions invest more in the outmigration of their better- educated children to the high-wage urban labor markets than do the poor families in these regions.<sup>5</sup> The relatively rich families in a poor rural (origin) state will also tend to receive more transfers from their family members who have migrated to the city, perhaps as a repayment for family investments in their migration. It should then be expected that private family transfers between poorer and richer states, which are expected to be largely transfers related to migration, are *not*

necessarily equalizing within the poor origin state. Tsui (1993) finds private transfers within and between the provinces of Sichuan and Guangdong increased inequality overall<sup>6</sup>. Gustafsson and Li (1997) also show that private transfers between families increase inequality, flowing from rich households to other relatively rich households, and not redistributing transfer income to ameliorate inequality.

However, this is an easily misinterpreted assessment of migration's total effect on inequality. The flow of well-educated rural workers to urban areas clearly benefits the migrants who tend to come from upper income families. It also has an effect on the market equilibrium wage structure, reducing the wages of the educated in the city, which should unambiguously reduce overall inequality, as well as reduce inequality within the high income urban destination regions. Again, the effect on the sending region will be to raise wages for the migrant class of educated workers, and this may be inequality-increasing in the poor sending regions. This effect on inequality within the origin region, however, is not likely to dominate the other beneficial effects of migration on inequality. The total effect of migration on inequality cannot be ascertained from a static decomposition of the transfer income's contribution to inequality, even if somehow the investment costs to produce the migrant transfers were properly measured and deducted from the transfers from urban to rural households or from richer to poorer areas. Most of the gains from migration are due to improvements in production efficiency, in other words, reducing the differences in productivity of similar workers in different locations in an economy. The efficiency gains are likely to outweigh the mixed effects on family inequality which should be measured as a capitalized net flow, after deducting the present value of investment costs. The outmigration of more productive workers from a low-wage market should not be misinterpreted as a social loss, because the private gain of the migrants dominates the potential indirect effects on inequality in their origin communities?

How can public transfer income be targeted to the poor, those who may need this transfer because they do not have a family support network on which to rely? To the extent that the public transfer merely displaces or "crowds out" private inter-household family transfers, the public transfer may not improve overall income inequality. It is reassuring that in both Tsui's (1993) study of rural Sichuan and Guangdong

from 1985-1990 and Gustafsson and Li's (1997) study of ten provinces from 1987 and 1995, public transfers are income equalizing, although the effect is small. On the other hand, there is evidence from Tsui that pension transfers from the state firms and collectives contribute to greater inequality, which confirms the worry that rural industries strengthen the resource base of local governments in areas that tend to be already relatively well-endowed. Thus, the township-village-enterprises are not likely to equalize incomes across regions in China by their transfers, but their productive contributions to efficient use of resources and to aggregate growth may still be important.

### **3.4. Income Sources and Health of the Elderly in Rural and Urban Areas**

Table 1 reports from a 1992 Survey on China's Support System for the Elderly conducted by the China Research Center on Aging the level of individual income of persons age 60 or over. Elderly males in urban areas have incomes that are about 2.5 times those in rural areas, and for women the income ratio is 2.6, although elderly women have only about half as much income as do men (Schultz and Yu, 1998c). The income of urban elderly is predominantly from public transfers, with pensions representing the largest share, particularly for men. Half of the income of elderly urban males is from pensions and another quarter is from government and communities subsidies. In contrast, the much poorer rural elderly receive a fourth as much of their income from public transfers, and rely heavily on private transfers for a third of rural male incomes and two-thirds of rural female incomes. Also, the urban elderly earn less than a fourth as much of their income as do the elderly in rural areas, whose extreme poverty could explain their continued work (i.e. 9.0 versus 43.4 percent for urban and rural males, and 2.1 versus 21.7 percent for urban and rural females as reported in Table 1). This economically vulnerable elderly group is relatively better protected by Chinese government welfare programs in the urban than rural areas<sup>7</sup>. In contrast, the much poorer rural elderly must often rely on private family support from their children. I have earlier argued that this group of poor rural elderly is most adversely affected by the birth quota. The next

generation of elderly in the rural areas of China will be even more vulnerable, having fewer children to support them, and few public pensions and deteriorating public health care (Ahmad and Hussain, 1989).

There are always ambiguities in estimating personal incomes when some goods and services are produced and consumed by the household, and other services flow from durable assets, such as owner-occupied housing or housing provided by an employer (Khan and Riskin, 1998). Also, family composition and the sharing of income and consumption is not always adequately measured in surveys. One approach to deal with these ambiguities of income measures and suitable adjustments of household income for the composition of households is derived from the work of Engel (1857), who observed that the share of food in total expenditures of a household declined monotonically among Belgium workers as the level of income increased. Thomas (1986) has illustrated that this “Engel law” that the share of food expenditures declines as income and welfare increases is also an empirical regularity in low-income countries today. In the elderly survey of China this food share tends to be higher for rural than urban men and women, and that the food share for elderly women tends to be larger than for men, suggesting that women are poorer than men in urban areas at all elderly ages, and women are poorer than men in rural areas for those 60-69 and over age 80, and approximate parity in the 70's (Schultz and Yu, 1998c).

Adult health status is difficult to measure in a self assessed survey, and one indicator that appears to be replicable, and to predict well clinically confirmed good health, and to increase subjectively assessed welfare of the elderly is their lack of physical limitations in performing activities of daily living (ADL) (Stewart and Ware, 1992; Strauss, et al., 1995). Summing the answers to five questions on the respondent's capacity to perform for themselves five everyday activities, an ADL index of good health is constructed which represents the absence of these limitations. Regressing this health index on age, education, and income Table 2 summarizes the results. Health declines for rural and urban men and women with advancing age, whereas the better educated report noticeably fewer limitations on their physical activities of daily living . The individual's income is associated with improvements in this health indicator for rural men and women, but has no added effect after education is held constant for urban men

and women. One interpretation is that the urban residents in China have access to free state-supported medical services, and thus to the extent that these services improve their functioning, this health benefit is enjoyed independent of their income. Conversely, in the rural areas collectivized medical institutions have generally been closed after the agricultural reforms, and rural health services are likely to have been privatized. Higher income elderly in rural areas are thus increasingly able to use more health care and report improved health outcomes compared with the rural poor.

#### **4. Conclusions**

Household surveys indicate that the elderly in rural areas of China are much poorer and in poorer health, than their urban counterparts, just as the wage levels in urban areas are on average two-and-a-half times the level in rural areas. The evidence of increasing returns to education that emerges from many sources of data in China suggest that post-secondary schooling is becoming more productive in the 1990's with the diffusion of economic reforms that increase the opportunity for workers to innovate and adopt new technologies and search out their best employment prospects. The financial decentralization of health and education programs, however, has created stronger inequalities among the elderly by income in the rural population than in the urban population, and there is parallel evidence that widening differentials according to income between their children's schooling (Knight and Li, 1996). If centralized government resources are needed for human resource development in China today, they are specifically needed to mitigate the growing inequality of human capital in the poor rural population. Going forward priority should be given to equalizing investment opportunities for children across future birth cohorts in China, which will require subsidizing the poor rural areas to invest in improving schools and child health and nutrition programs. This is an area where the Chinese government made great progress in the first two decades of the Peoples' Republic. It will be a challenge for the Central government to adequately support these targeted human capital investment programs, which should shelter the young from the consequences of the growing rural-urban economic disparities. In the longer term, as agreements between China and the World

Trade Organization reduce domestic protection from the relative prices of the world economy, the task will be to help the rural poor leave the less productive areas of agriculture for the Township-Village-Enterprises and to migrate to better jobs in urban areas. In the meanwhile, the rural elderly are likely to be left behind, and to represent a salient poverty problem that China has made only worse by its past birth quotas population policy. The rural elderly have lost out in the increasingly vigorous private competition for income, and they have also lost out in the political competition for public provision of social services in old-age support, health and education.

Table 1

Income of the Elderly, By Sex and Region in 1992 and its Percentage Composition by Income Source\*

	Urban		Rural	
	Men	Women	Men	Women
Total Income in Yuans, including home production	2549.	1416.	1035	538.
(Percent of Total):				
Earned Income	9.0	2.1	43.4	21.7
Interest and Rents	2.5	4.5	1.6	1.4
Public Transfers:				
Pensions	49.9	27.9	7.1	0.5
Government Subsidies	27.9	27.5	5.9	3.0
Community Support	0.1	0.4	6.3	8.7
Total Public Transfers	(78.0)	(55.7)	(19.3)	(12.2)
Private Transfers:				
From Children	7.8	33.6	32.5	61.0
From other Relatives	.5	1.3	2.3	3.2
Total Private Transfer	(8.3)	(35.0)	(34.8)	(64.2)
Other Income Sources	2.2	2.6	0.9	0.5
Sample Size	4742	4933	4822	5372

\* Derived from the survey on China's Support System for the Elderly conducted by the China Research Center on Aging. Elderly include those over age 59 on January 1, 1992. The survey is a stratified, nationally representative, sample of all provinces and municipalities of China, and is self weighted according to the 1990 Census.

Source: Schultz and Yu 1998c, Table 2.

Table 2: Regression of ADL Index of Good Health for Elderly Chinese in 1992, by Urban-Rural and Gender<sup>1</sup>

Selected Explanatory Variables <sup>2</sup>	Urban		Rural	
	Men	Women	Men	Women
Age compared with 60-64				
65-69	-0.171 (3.33)	-0.161 (3.27)	-0.49 (1.25)	-0.065 (1.43)
70-74	-0.261 (4.60)	-0.296 (5.40)	-0.188 (4.21)	-0.191 (3.96)
75-79	-0.525 (7.53)	-0.585 (8.47)	-0.319 (5.91)	-0.409 (7.42)
80-84	-0.800 (8.00)	-1.35 (15.1)	-0.549 (7.21)	-0.718 (10.1)
85 or more	-1.61 (9.96)	-2.26 (17.9)	-1.04 (8.65)	-1.57 (15.9)
Education compared with				
Primary	.089 (1.68)	.005 (0.12)	.032 (1.95)	.100 (1.36)
Junior Middle	.112 (1.79)	.084 (1.18)	.120 (2.06)	.014 (0.07)
Senior Middle	.143 (1.95)	.149 (1.62)	.216 (1.89)	.112 (0.24)
College or more	.192 (2.21)	.028 (0.25)	.601 (2.15)	— —
Household Income per capita (Yuan x 10 <sup>3</sup> )	.002 (0.70)	.003 (1.00)	.003 (2.00)	.006 (2.51)
Mean of Health Index Variable	9.61	9.53	9.72	9.59

Source: Schultz and Yu 1998b, Table A-3.

<sup>1</sup> Defined as five items from the limitations of Activity of Daily Living (ADLs): unable to dress by oneself, eat, bathe, go to bathroom, and go outside by oneself. If “no difficulty” the score assigned to non-missing items is 10, if “some difficulty” item scored 5, if “complete difficulty” item is scored 0. The sum of the scores is divided by the number of non-missing items. The index of health ranges from zero to ten.

<sup>2</sup> Additional explanatory variables included in the ordinary least squares regression are whether the person is of a minority (not Han) ethnic group, and the fertility. Fertility was insignificant and minority was weakly negative for urban male and positive for urban female and insignificant for rural residents of either gender. Beneath OLS coefficients in parentheses are the absolute value of the t ratio. See note of survey source in Table 1.

## References:

- Ahmad, E. and A. Hussain, 1989, "Social Security in China: A Historical Perspective," China Program Working Paper 4, STICERD, London School of Economics.
- Becker, G. S., 1981, A Treatise on the Family, Cambridge, MA: Harvard University Press.
- Becker, G. S. and Lewis, 1974, "Interaction between Quantity and Quality of Children", in Economics of The Family, (ed.) T.W. Schultz, Chicago: University of Chicago Press.
- Byron, R. and E. Mamatoto, 1990, "Returns to Education in China", Economics Development and Cultural Change, 38 (3): 783-796.
- Coale, A. J. and E.M. Hoover, 1958, Population Growth and Economic Development in Low-Income Countries, Princeton, NJ: Princeton University Press.
- deBraw, Alan, J. Huang, S. Rozelle, L. Zhang, and Y. Zhang, 2002, "The Evolution of China's Rural Labor Markets During the Reform", Journal of Comparative Economics, 30:329-353.
- Engel, E., 1857 "Die Productions- und Consumptionsverhältnisse des Königreichs Sachsen," reprinted as appendix to International Statistical Institute Bulletin, 1895, Vol. 9, pp. 1-74.
- Feder G., L. Lau, J. Lin, and X. Luo, 1992, "The Determinants of Farm Investment and Residential Construction in Post Reform China," Economic Development and Cultural Change, 41 (1): 1-26.
- Fogel, R.W., 1994, "Economic growth, population theory, and physiology", American Economic Review, 84(3): 369-395.
- Foster, A. D. and N. Roy, 1992, "The Dynamics of Education and Fertility: Evidence from a Family Planning Experiment," processed Brown University, Providence, RI.
- Glewwe, P. and H. Jacoby , 1995, "An Economic Analysis of Delayed Primary School Enrollment and Childhood Malnutrition in a Low Income Country", Review of Economics and Statistics, 77:156-169.
- Griffin, K. and R. Zhao, (eds.) 1993, The Distribution of Income in China, London: MacMillan.
- Gustafson, B. and Li Shi, 1997, "Types of Income and Inequality in China at the End of the 1980s," Review of Income and Wealth, 43: 211-226.
- Gustafson, B. and Li Shi, 1998, "The Structure of Chinese Poverty, 1988," processed University of Goteburg, Sweden.
- Gustafson, B. and Li Shi, 2000 "Economic Transformation and the Gender Earnings Gap in Urban China," Journal of Population Economics, 13:305-329.
- Higgins, M. and J. Williamson, 1997, "Age Structure Dynamics in Asia and Dependence on Foreign Capital," Population and Development Review, 23(2): 261-294.

- Jamison, D. T., 1986, "Child Malnutrition and School Performance in China," Journal of Development Economics, 20:299-309.
- Jian, Tianlun, J. D. Sachs, and A. M. Warner, 1996, "Trends in Regional Inequality in China," China Economic Review, 7 (1): 1-21.
- Johnson, D. G., 1990, The People's Republic of China, 1978-1990, San Francisco, CA: ICS Press.
- Johnson, D. G., 1994, "Effects of Institutions and Policies on Rural Population Growth with Application to China," Population and Development Review, 20 (3): 503-531.
- Johnson, D. G., 1998, "China's Great Famine: Introductory Remarks," China Economic Review, 9(2): 103-109 (and remainder of symposium issue).
- Johnson, D. G., 1999, "Population and Economic Development," China Economic Review, 10(1).
- Johnson, K. A., 1983, Women, The Family and Peasant Revolution in China, Chicago: University of Chicago Press.
- Khan, A. R. and C. Riskin, 1998, "Income and Inequality in China: Composition, Distribution and Growth of Household Income 1988 to 1995," China Quarterly, June.
- Khan, A. R., K. Griffin, and C. Riskin, 1998, "Income Distribution in Urban China During the Period of Economic Reform and Globalization," processed Columbia University, presented at AEA meetings, January 1999.
- Knight, J. and Li Shi, 1996, "Educational Attainment and the Rural-Urban Divide in China," Oxford Bulletin of Economics and Statistics, 58(1):83-117.
- Li, Tianyong and Junsen Zhang, 1998, Returns to Education Under Collective and Household Farming in China," Journal of Development Economics, 56: 307-335.
- Lin Yunhua, Chew Soon Beng, and Li Wenzhi, 1998, "Education, Experience, and Productivity of Labor in China's Township and Village Enterprises," China Economic Review, 9 (1): 47-58.
- Maddison, A., 1998, Chinese Economic Performance in the Long Run, Paris: OECD Development Centre.
- Meng, Xin, 1998, "Male-Female Wage Determination and Gender Wage Discrimination in China's Rural Industrial Sector," Labour Economics, 5: 67-89.
- Mincer, J., 1974, Schooling, Experience, and Earnings, New York: Columbia University Press.
- Mokfan, K. M. and R. Subramaniam, 1998, Women in the People's Republic of China, Program Department East and Social Development Division, Manila: Asian Development Bank.
- National Research Council, 1986, Population Growth and Economic Development: Policy Questions, Washington, D.C.: National Academy Press.
- Prescott, N. and D. T. Jamison, 1985, "The Distribution and Impact of Health Resource Availability in China," International Journal of Health Planning and Management, 1:45-56.

- Rosenzweig, M. R. and K. I. Wolpin, 1980, "Testing the Quantity-Quality Fertility Model: The use of Twins as a National Experiment," Econometrica, 48 (1): 227-240.
- Rosenzweig, M. R. and K. I. Wolpin, 1982, "Governmental Interventions and Household Behavior in a Developing Country," Journal of Development Economics, April, 10 (2): 209-226.
- Rozelle, S., 1994, "Rural Industrialization and Increasing Inequality: Emerging Patterns in China's Reforming Economy," Journal of Comparative Economics, 19:362-391.
- Schultz, T. P., 1988, "Education Investment and Returns" in H. Chenery and T. N. Srinivasan (eds.), Handbook of Development Economics, Vol. 1, Amsterdam: North Holland Publishing Co.
- Schultz, T. P., 1994, "Human Capital, Family Planning and Their Effect on Population Growth," American Economic Review, 84(2):255-260.
- Schultz, T. P.,(ed.), 1995, Investment in Women's Human Capital, Chicago: University of Chicago Press
- Schultz, T. P., 1997, "Demand for Children in Low Income Countries," in M. R. Rosenzweig and O. Stark (eds.), Handbook of Population and Family Economics, Amsterdam: North Holland Publishing Co.
- Schultz, T.P., 1999, "Productive Benefits of Improving Health: Evidence from Low-Income Countries", paper to be presented at American Economic Association meetings, Boston, January 6, 2000. processed, Yale University, New Haven CT.
- Schultz, T. P., 2000, "Labor Market Reforms: Issues, Evidence and Prospects," in A. O. Kreuger (ed.), Economic Policy Reform: Second Stage, Chicago: University of Chicago Press, pp.318-320.
- Schultz, T.P. , 2002, "Wage Gains Associated with Height as a form of Health Human Capital", American Economic Review, 92(2):349-353.
- Schultz, T. P. and A. Tansel, 1997, "Wage and Labor Supply Effects of Illness in Côte d'Ivoire and Ghana," Journal of Development Economics, 53: 251-286.
- Schultz, T. P. and Xuejun Yu, 1998a, "Earnings and Returns to Human Capital Investments during the Economic Transition in Urban China," processed, Yale University, New Haven, Connecticut.
- Schultz, T. P. and Xuejun Yu, 1998b, "Health Status, Labor Force Behavior and Living Arrangements of the Elderly in China," processed, Yale University, New Haven, Connecticut.
- Schultz, T. P. and Xuejun Yu, 1998c, "Population Aging, Old-Age Support and Inter-generational Transfers in China," processed, Yale University, New Haven, Connecticut.
- Schultz, T. P. and Zeng Yi, 1995, "Fertility in Rural China," Journal of Population Economics, 8: 329-350.
- Schultz, T. P. and Zeng Yi, 1999, "Impact of Institutional Reform from 1979 to 1987 on Fertility in Rural China," China Economic Review, 10 (2): 141-160.
- Shen, Tiefu, J.P. Habicht, and Ying Chang, 1996, "Effects of Economic Reforms on Child Growth in Urban and Rural Areas of China", New England Journal of Medicine, August, 8: 400-406.

- Stewart, A. L. and J. E. Ware, Jr., (eds.), 1992, Measuring Functioning and Well Being, Durham, North Carolina: Duke University Press.
- Strauss, J., P. J. Gertler, O. Rahman, and K. Fox, 1995, "Gender and Life-Cycle Differentials in the Patterns and Determinants of Adult Health," in T. P. Schultz (ed.) Investment in Women's Human Capital, Chicago: University of Chicago Press.
- Subramaniam, Ramesh, 1997, "Labor Market Returns to Human Capital Investment in the PRC," background paper for Program Department East Division 1, Manila: Asian Development Bank.
- Thomas, D., 1986, "The Food Share as a Welfare Measure," unpublished Ph.D. dissertation, Princeton University, Princeton, New Jersey.
- Tsui, Kai Yuen, 1993, "Decomposition of China's Regional Inequalities," Journal of Comparative Economics, 17: 600-627.
- Yan, Lijing, 1999, "Secular Trends in Stature, Nutritional Status and Mortality in Twentieth Century China," processed, University of California at Berkeley, presented Population Association of America, New York City(March).
- Yang, Dennis Tao, 1997a, "China's Land Arrangements and Rural Labor Mobility," China Economic Review, 8 (2): 101-116.
- Yang, Dennis Tao, 1997b, "Education in production: measuring labor quality and management" American Journal of Agricultural Economics, 79:764-772.
- West, L. A. and C. D. W. Wong, 1995, "Fiscal Decentralization and Growing Regional Disparities in Rural China: Some Evidence in the Provision of Social Services," Oxford Review of Economic Policy, 11: 70-84.
- Wong, C. P. W. and W. T. Woo, 1995, Fiscal Management and Economic Reform in the People's Republic of China. Hong Kong: Oxford University Press.
- Zhang, Junsen, and Kazuo Nishimura, 1993, "The Old Age Security Hypothesis Revisited," Journal of Development Economics, 41: 191-202.
- Zhang, J. and Y. Zhao, 2002, "Economist Returns to Schooling in Urban China, 1988-1999", processed , Chinese University of Hong Kong.

**Endnotes:**

1. I do not know of social experiments which have assessed how the random provision of pensions to young individuals has modified their lifetime fertility (Schultz, 1997). Persons observed in a survey with and without a pension tend to differ in many other ways, including perhaps their fertility goals, savings behavior, risk aversion, and healthiness. In particular, a person may have selected their job because they had a specific interest in obtaining a job-related pension, or because they wanted to avoid the burden of rearing children to support them in old age, or retire early.
2. Anhui, Beijing, Gansu, Guangdong, Henan, Hubei, Jiangsu, Liaoning, Shanxi, and Yunnan are included in 1988 and Sichuan is added in 1995, but excluded in this study to maintain comparability between the two years.
3. Collected by the Institute of Economics of the Chinese Academy of Social Sciences.
4. This panel survey collected in 1989, 1991 and 1993 from rural and urban areas. See Yan (1999).
5. Brazil is a standard example of this pattern, where the Northeast is extremely poor compared with the South, and yet the least educated are the last to migrate to the more prosperous regions of the country. As a result the pattern is for interstate wage relative differences to be larger for the least educated workers, and to become more similar for the highly educated who are the most mobile workforce. Conversely, private wage returns are often smaller in the more developed, higher income states, such as Sao Paulo, than in the low income Northeastern region. The same pattern has been noted in China.
6. This study is based on the rural survey team of the State Statistical Bureau survey for 1985, 1988, and 1990 for these two provinces.
7. It should be noted that the value of medical services received by the urban elderly do not appear to be imputed a value and added to the income and expenditure accounts in the 1992 Survey of the Elderly or counted in the government subsidies. Thus, the real income gap between rural and urban is probably larger than reported in table 1.