

The Role of Education in Economic Growth through the Sectoral Reallocation of Labor

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Abstract

The main questions of this paper are as follows: Whether and to what extent does rising educational attainment contribute to a country's economic growth by facilitating the reallocation of labor from the agricultural sector to the non-agricultural sector?

The transition from the agricultural sector to the non-agricultural sector ("transition" hereinafter) is an important aspect of a country's development. Consider China as an example. In China, around 70% of the labor force worked in the agricultural sector in 1980, whereas only 47% remained in the agricultural sector in 2000. Over the same period of time, China's gross domestic product (GDP) per capita increased from U.S. \$173 to \$856.¹ In addition, cross-country data demonstrate that developed countries have a lower share of employment in agriculture than less-developed countries. For instance, high income countries had 4% of their employees engaged in the agricultural sector in 2000, whereas middle income countries had 40% of their employees working in the agricultural sector. In low income countries, the share may be even larger: in Bangladesh, for example, more than 60% of employees work in the agricultural sector.

Based on these empirical observations, using calibration exercises a number of papers have demonstrated the possibility that income differences across countries can be explained by different onsets of transition (Gollin et al. 2002, 2004, Parente et al. 2000, Restuccia et al. 2003). In contrast, there is little empirical research based on micro-level data studying the factors that affect the speed of transition. As far as I am aware, the most closely related empirical study of transition was carried out by Jeong and Kim (2005) using data for Thailand. However, the authors focused more on replicating gradual transition than on determinants governing the speed of transition. They relied on the assumption of "sector specific complementarity between work-experience and labor" to explain the slow transition, but did not provide direct empirical evidence for this assumption.

In contrast to existing research, this paper tries to shed light on one hypothesized factor affecting the speed of transition: raising educational attainment may facilitate the labor force moving from the agricultural sector to the non-agricultural sector.²

¹ The data is from the World Development Indicators; the units are 2000 US dollars.

² This hypothesis is influenced by Caselli and Coleman (2001): The authors argue that rising educational

I use a Chinese household panel dataset--the China Health and Nutrition Survey (CHNS)--to measure the extent to which educational attainment raises the probability of a worker obtaining a non-agricultural job. To extract the causal effect of education, I use the increase in the number of secondary schools during the Cultural Revolution (CR) in China (1966 to 1976) as an instrumental variable. Reducing the differences between the peasantry and the rest of the population was identified as being a major goal of the CR; as a result of this ideology, the policies of this period promoted mass education among underserved groups, including rural populations especially in terms of the secondary schooling (Hannum 1999). My preliminary results suggest that one more secondary school per 10,000 people in a province is correlated with an increase in 1.15 years of schooling. Using a Probit model with this instrumental variable, I estimate that one more year of schooling raises the probability a worker will obtain a non-agricultural job by 4.53%.

However, what does this estimation imply for transition and aggregate economic growth? In China, the share employed in agriculture has decreased from 68.1% in 1982 to 50% in 2000 (Chinese Statistical Yearbook, 2003). On the other hand, the average years of schooling of workers in China has increased from 5.83 years to 7.66 years (Chinese Population Census 1982, 2000). Hence, this increase in schooling, 1.84 years, may have contributed 8.34% points to the decrease in the agricultural share of employment from 1982 to 2000. In terms of the real GDP growth, accurate growth accounting requires further study. However, a back-of-the-envelope calculation suggests that the decrease in the agricultural employment share due to rising educational attainment implies an increase of 0.65% points of the real GDP per worker growth per annum.³

Although the growth and level accounting remains to be done, I believe that this paper can contribute to the economic growth literature by testing whether and to what extent education causes growth. Within this research literature, many papers have suggested the possibility of a causal effect of education on growth, but a recent study by Bils and Klenow (2000) questions this causal relationship. For example, if we include the role of education in sectoral reallocation (0.65% point), the contribution of education to the annual growth rate of the real GDP per worker increases from about 20% to 32%.⁴ Therefore, we can conclude that education causes growth (at least 12%) and that its contribution to growth is significant.

attainment due to falling costs of education can explain income convergence across states in the U.S.

³ The transition boosts the GDP per worker by changing the non-agricultural employment share from the base year to the present, multiplied by the difference in real output per worker between the non-agricultural sector and the agricultural sector in the present year, divided by real GDP per worker in the base year. The GDP per worker in the non-agricultural sector is about 4 to 5 times higher than that in the agricultural sector (the World Development Index) and the growth rate of the real GDP per worker from 1978 to 1998 is 5.2% per annum (Young 2003). Therefore, the sectoral reallocation due to education increased the annual economic growth of China by 0.65% ($= [1 + 8.34\% * 3/5 * (1.052)^{18}]^{1/18} - 1$).

⁴ Young (2003) estimated that the growth rate of human capital in the non-agricultural sector is 1% per annum. If the human capital in the agricultural sector is also 1%, the contribution of education is 19.2%.