Human capital Kuznets curve with subsistence consumption level☆

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ABSTRACT

We examine the human capital Kuznets curve in a simple model that does not assume increasing returns to scale in human capital formation. With a utility function that specifies a subsistence consumption level, consumption is a necessary good and education is a luxury good. As the children of poor households receive a low level of education, the gap in human capital endowments expands between poor and rich households. Eventually, economic development increases income and expenditure for education, and income inequality declines.

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1. Introduction

Recently, several empirical studies have investigated the human capital Kuznets curve, a dynamic relationship in which human capital inequality increases during early phases of economic development and then decreases in later phases of development. The human capital Kuznets curve, as well as the original income Kuznets curve explored by Kuznets (1955), generates an inversed *U* relationship between human capital inequality and per capita human capital. The empirical evidence, however, is mixed. For example, De Gregorio and Lee (2002) demonstrate an inversed *U* relationship between education attainment and education dispersion, while Castello and Domenech (2002) find a negative correlation between the education gap and per capita education. One of the main issues of the empirical literature concerns how to measure the level of human capital. Lim and Tang (2008) suggest that the use of average education as a proxy for human capital is subject to a margin of error, and instead estimate the human capital Kuznets curve by considering decreasing returns to education in human capital formation.

The theoretical literature examines the evolution of inequality with the Kuznets hypothesis in overlapping generations models where human capital accumulation is the engine of economic growth.[1] Galor and Tsiddon (1996) consider a small open economy with both technological development and human capital accumulation. Under the assumption that human capital accumulation has a positive but diminishing impact on improvements in technology, during the early phases of development, output exhibits increasing returns to human capital accumulation, and inequality in human capital rises. Then, in later phases, however, these increasing returns shift to decreasing returns and inequality declines. Glomm and Ravikumar (1998) present a sophisticated model in which increasing returns to scale expand the human capital gap between rich and poor individuals. However, if there is a complimentary relationship between the consumption of the older generation and the leisure of the younger generation, rich young individuals reduce their educational efforts and the speed of human capital accumulation falls; the human capital gap narrows. Although the literature develops convincing explanations, several questions remain: First, are increasing returns necessary for the derivation of the human capital Kuznets curve? Second, do children in rich households spend a shorter time studying?

The purpose of this paper is to develop a simple model that generates the human capital Kuznets curve without assuming increasing returns to education. To this end, we consider a utility

[1] As these models assume the consumption good is produced by human capital alone with a linear technology, there is no distinction between human capital and income.
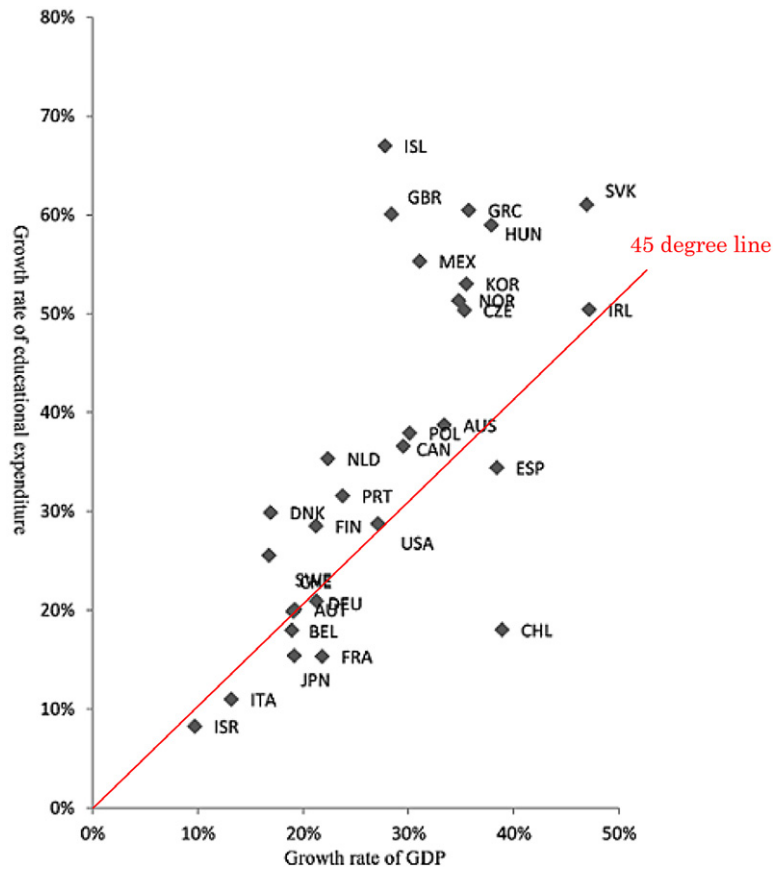
Fig. 1. Growth rates of GDP and educational expenditure from 2000 to 2005.
Source: National Accounts at a Glance−2010 edition, http://stats.oecd.org/Index.aspx?DataSetCode=NAAG_2010, Education at a Glance 2008, http://dx.doi.org/10.1787/401864037554.

function that features Stone–Geary preferences with a subsistence consumption level.[2] As such, poor households must prioritize consumption for subsistence over their children's education; they cannot afford to invest in the education of the next generation. Hence, consumption is a necessary good and education is a luxury good. Indeed, from Fig. 1, the growth rate of educational expenditure is greater than growth rate of GDP in many countries, indicating that education is a luxury good. In the early stages of economic development, as only rich households have large education expenditures, human capital inequality increases. In later stages, however, decreasing returns to human capital accumulation reduce inequality. The human capital Kuznets curve is therefore a natural outcome of the development process.

Our paper is related to studies that consider human capital formation, income inequality, and economic development in overlapping generations models, particularly those that assume non-homothetic preferences.[3] Mani (2001) analyzes the interaction between income distribution and patterns of demand for goods with economic development under non-homothetic preferences. Moav (2002) shows that a convex bequest technology leads to the persistence of inequality. Das (2007) considers limited parental altruism that depends on parents' consumption level, and examines persistent inequality. In contrast, to the best our knowledge, our paper represents the first attempt to identify the theoretical human capital Kuznets curve by focusing on the luxury good property of education under Stone–Geary preferences and decreasing returns in human capital formulation.

2. The model

We consider an overlapping generations economy where individuals live for two periods: young and old. The human capital of the ith individual in the tth generation is denoted by h_t^i. For simplicity, we assume there are two types of individuals, rich and poor, in period zero.[4] Their endowments of human capital are, respectively, h_0^r and h_0^p, where $h_0^p < h_0^r$.

All individuals have a subsistence consumption level $\underline{c}$, a necessary prerequisite for sustaining life. Moreover, we consider warm glow preferences: parents derive utility from expenditure on the education of their children. Formally, the preferences of individual i born in period t are denoted by

$$U_t^i = \alpha \log \left(c_{t+1}^i - \underline{c} \right) + \beta \log x_{t+1}^i, \quad \alpha, \beta \in (0, 1). \tag{1}$$

We ignore consumption in the young period. c_{t+1} and x_{t+1} represent, respectively, consumption in the old period and expenditure on the education of children.

Individual levels of human capital formation are determined by education expenditure. In particular, considering diminishing returns to education, individuals born in period $t + 1$ accumulate human capital according to

$$h_{t+1}^i = A \left(x_t^i \right)^\delta, \quad \delta \in (0, 1), A > 0. \tag{2}$$

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[2] The empirical literature includes cross-country studies that investigate developing countries where many households live below the poverty line.

[3] For a recent survey, see Galor (2011) and Sauer and Zagler (2011).

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[4] This assumption is made for simplicity, but is not essential, as we can define the gap of human capital inequality using (8) by picking any two families if there are many families with different human capital levels. In this case our result (Proposition) holds with respect to any two families.