

# Mortality decline, human capital investment, and economic growth

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## Abstract

We examine the role of increased life expectancy in raising human capital investment during the process of economic growth. We develop a continuous time, overlapping generations model in which individuals make optimal schooling investment choices in the face of a constant probability of death. We present analytic results, followed by results from a calibrated version of the model using realistic estimates of the return to schooling. Mortality decline produces economically significant increases in schooling and consumption. Allowing schooling to vary endogenously produces a much larger response of consumption and capital to mortality decline than is observed when schooling is held fixed. © 2000 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

... decline in the death is an indispensable prerequisite for modern economic growth

Simon Kuznets (1973).

Two of the most salient aspects of the process of economic growth are the decline in mortality and the growth of investment in human capital. These phenomena are visible in both long-term historical data for the countries that

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developed early as well as broadly, and in more accelerated form, in the post-World War II period. Over the 19th century, e.g., life expectancy at birth in England rose from 37.3 to 48.2 years, and by 1930, it had reached 60.8. The average number of years of schooling rose from 2.3 for the cohort born 1801–1805 to 9.1 for the cohort born 1897–1906.<sup>1</sup> Averaging across lower income countries, life expectancy at birth rose from 42.2 in 1950 to 63.3 in 1990. Gross secondary school enrollment increased from 17.1% in 1960 to 46.9% in 1990.<sup>2</sup>

Both the decline in mortality and the increase in schooling are intimately related to several aspects of the growth process. Mortality fell both directly because of higher incomes (which led to better nutrition) and because of advances in health technology. Mortality decline, in turn, triggered the process of demographic transition, in which, with a varying lag, fertility rates fell.<sup>3</sup> The increase in human capital accumulation has been attributed to an increase in the return to schooling (Foster and Rosenzweig, 1996; Mincer, 1996). Higher investment in human capital has in turn been linked to changes in fertility behavior, via a quality–quantity tradeoff (Becker and Lewis, 1973); to an increase in the growth rate of technology (Lucas, 1988); and directly to a higher level of output (Mankiw et al., 1992).

In this paper, we look at a direct relationship between mortality and human capital accumulation. Specifically, we study the effect of mortality decline in raising human capital accumulation by increasing the horizon over which investments in schooling will be paid off. Although much of the decline in mortality has been in infancy, before any investment in schooling will have taken place, there have also been significant declines in mortality later in life. For example, in Sweden, male life expectancy at age 5 rose from 48.3 to 57.7 between 1800 and 1900. Over the same period, life expectancy at birth rose from 35.9 to 54.3. In India, male life expectancy at age 10 rose from 39.0 to 48.8 over the period 1951–1971. Over the same period, male life expectancy at birth rose from 32.4 to 46.4.<sup>4</sup>

The effect of mortality on education has been investigated both empirically and theoretically. Ram and Schultz (1979) argued that improvements in mortality were an important incentive to increase investment in education, and that the post-war experience of India was consistent with this incentive effect being significant. Preston (1980) calculated the degree to which reductions in mortality raised the internal rate of return to investments in education, but found that increases in the return to schooling were not sufficient to explain large increases in enrollment. Meltzer (1992) extended Preston's work, arguing that the elasticity of enrollment

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<sup>1</sup> Livi-Bacci (1997), Table 4.3. Matthews et al. (1982), Table E.1..

<sup>2</sup> Life expectancy is from Schultz (1997). School enrollment is from World Bank Development Indicators (1999). The samples used in the two sources differ slightly.

<sup>3</sup> See Easterlin (1996), Chap. 6, for a discussion of these issues.

<sup>4</sup> Keyfitz and Flieger (1968), Ram and Schultz (1979).

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