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Infectious disease and preventive behavior in an overlapping generations model

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Abstract

This paper incorporates prevalence of disease and agent's preventive behavior (i.e., health investment) into a small open overlapping generations model and investigates the dynamic behaviors of the competitive equilibrium allocation. Using the model, it is shown that agents' 'prevalence-elastic behaviors', which are supported from empirical studies, can be obtained, and that such agents' behaviors cause the cyclicity of the spread of disease. We also show that although the agents' preventive behavior in a competitive equilibrium may be insufficient because of the existence of external effects, a one-shot medical aid from foreign countries does not necessarily improve the agents' welfare in the Pareto sense.

JEL classification: I10; I12; I18; O41

Keywords: Infectious disease; Health investment; Overlapping generations model; Prevalence-elastic behavior

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1. Introduction

According to the World Health Organization (WHO) (1999a), infectious diseases were the primary cause of mortality in 1998, causing about one-fourth of all deaths in the world. In Sub-Saharan Africa, in particular, the spread of HIV/AIDS and malaria causes serious public health problems. Fig. 1 shows the United Nations Population Division's estimate of how the HIV/AIDS epidemic reduces average life expectancy. In Botswana, for example, the average life expectancy decreases from 67.6 years to 44.4 years. Moreover, the spread of these diseases undermines economic development. It decimates the workforce, creates a large number of orphans, and puts tremendous pressures on health and social services. Over (1992) estimates that HIV/AIDS reduces GDP growth rates in Sub-Saharan countries by about 1.2 percent per year. In addition, Gallup and Sachs (2001) conclude that malaria slows economic growth in African countries by 1.3 percent per year. The World Bank (2001) estimates that, compounded over 35 years, this amounts to a 32 percent reduction in the GDP of African countries. The fact that the spread of the infectious diseases lowers the average life expectancy and reduces economic growth implies that it worsens the welfare of economic agents, especially in Sub-Saharan Africa.

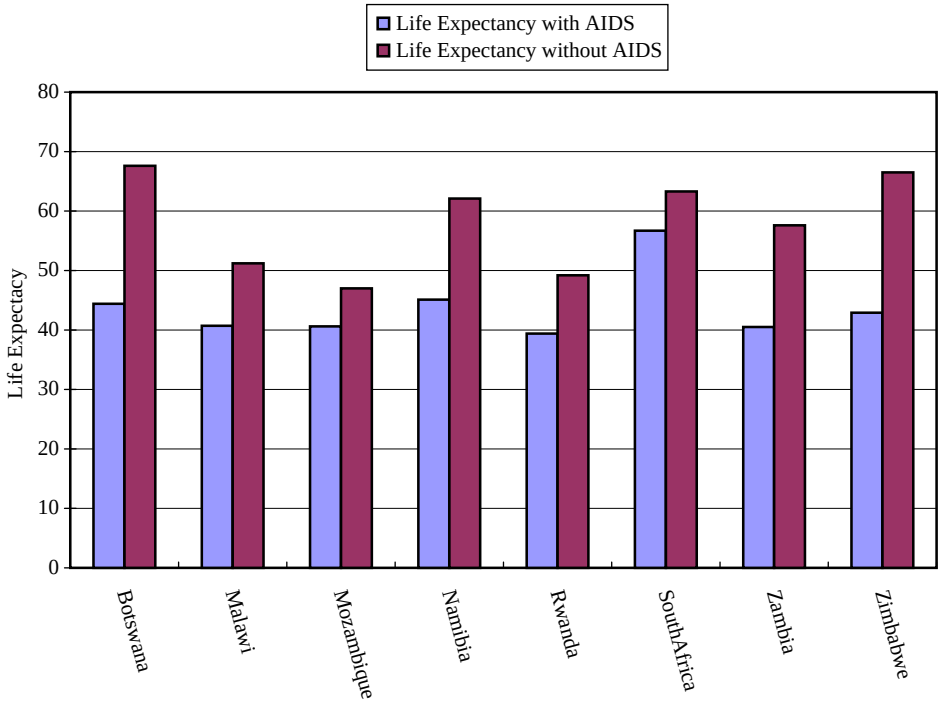

Fig. 1. The effect of HIV/AIDS on life expectancy. *Source*: World Population prospects the 2000 revision highlights (United Nations Population Division).