ELSEVIER

Journal of Development Economics 86 (2008) 61 – 75

JOURNAL OF Development ECONOMICS

www.elsevier.com/locate/econbase

Geography, health, and the pace of demo-economic development ☆

Holger Strulik

Department of Economics, University of Hannover, Koenigsworther Platz 1, 30167 Hannover, Germany

Received 6 July 2005; received in revised form 15 January 2007; accepted 28 March 2007

Abstract

This paper investigates the impact of subsistence consumption and extrinsic and intrinsic causes of child mortality on fertility and child expenditure. It offers a theory for why mankind multiplies at higher rates at geographically unfavorable, tropical locations. Placed into a macroeconomic framework this behavior creates an indirect channel through which geography shapes economic performance. It is explained why it are countries of low absolute latitude where we observe exceedingly slow (if not stalled) economic development and demographic transition.

JEL classification: J10; J13; O11; O12
Keywords: Demographic Transition; Geography; Health, Nutrition; Cross-country divergence

1. Introduction

As for every species, survival of humans is easier in some regions of the world and harder in others. In particular tropical regions – defined by an absolute latitude below 23.5° – provide an unfavorable location for a child to survive whereas survival is almost certain at latitudes of 40° and higher. This fact is visualized in Fig. 1.a which shows for 137 countries average absolute latitude against the probability for a child to survive its fifth birthday.[1]

Interestingly, the human population grows at higher rates at low geographic latitudes. This striking fact is shown in Fig. 1.b. From a biological viewpoint this behavior of humans seems bizarre. Why should a species multiply at higher rates in environments for which it is less fit to live in?

A seemingly obvious explanation is the demographic transition according to which fertility follows a decline of mortality with delay so that the time path of population growth describes an inverted u, rising in its initial phase and falling later. Given that the demographic transition started earlier at geographically favorable locations, a negative correlation between latitude and population growth follows automatically. High-latitude countries have accomplished the transition already, resting at low mortality and fertility rates. Low-latitude countries have experienced some reduction of mortality but this has not yet triggered a comparable decline of fertility rates. The problem with this argument is that a picture similar to Fig. 1.b could have been drawn for every decade for which the data are available. A more

☆ I would like to thank Carl-Johan Dalgaard, Oded Galor, Volker Grossmann, Omer Moav, Fidel Perez Sebastian, Nikolaus Siegfried, participants at seminars in Copenhagen, Hannover, and Vienna, and three anonymous referees for useful comments.

E-mail address: strulik@vwl.uni-hannover.de.

[1] We focus on child survival rates, which will be the crucial variable in the theoretical model. Similar figures can be drawn for infant survival and longevity. As Schultz (1999) notes, intercountry differences in life expectancy are dominated by rates of infant and child survival.

0304-3878/$ - see front matter © 2007 Elsevier B.V. All rights reserved.
doi:10.1016/j.jdeveco.2007.03.004

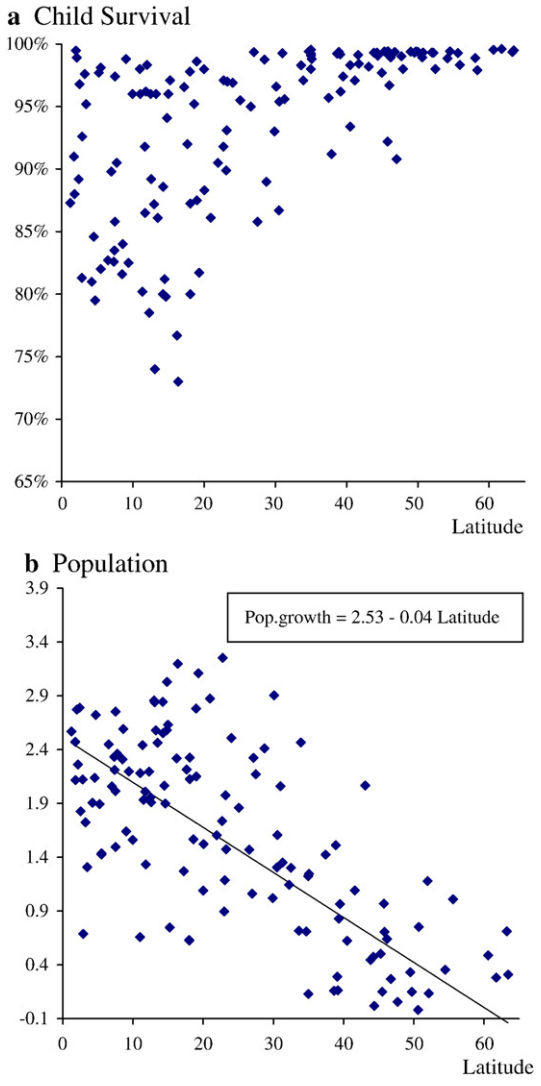

Fig. 1. Absolute latitude against child survival (left) and population growth (right) a) child survival rate = 1-under-5-mortality rate, year 2000, b) $R^2 = 0.506$. Data from World Bank (2004) and Masters and McMillan (2001).

appropriate description of the empirical regularities is thus that the population in geographically unfavorable regions grows at higher rates along the invertedly u-shaped transition path.

A study by Reher (2004) supports this view. It classifies the world's countries according to their position in the demographic transition into forerunners, followers, trailers, and latecomers. A central result is that population growth along the transition path peaks at the lowest rate for forerunners, at considerably higher rates for followers and trailers, and at the highest rate for latecomers. The group of forerunners contains almost exclusively European and Northern American countries located at high latitudes with temperate climate. Followers and trailers (mostly Asian and South American countries) are less favorably located, on average just inside the tropics, while latecomers (mostly from Sub-Saharan Africa) are clearly tropically located. The observation of regional-specific patterns of demographic transition is confirmed in Fig. 2. It shows the historical peak of population growth – assumed at country specific years between 1870 (in Sweden) and 1990 (in Nigeria) – against absolute latitude for 128 countries. Population growth tends to be higher along the path of demographic transition for countries of lower absolute latitude.

This paper proposes a novel theory that explains not only the inverted u-pattern of population growth but also why the inverted u-shaped curve shifts upwards (i.e. in direction of higher population growth rates) when absolute latitude decreases. Placed into a macroeconomic context this mechanism can explain why economic and demographic development is slower at tropical locations and why tropically located countries are particularly prone to get stuck in a poverty trap.

A key element of the theory is a partition of child survival rates into extrinsic and intrinsic components. While the extrinsic part is exogenous to the individual parent the intrinsic part is individually controllable through expenditure on child nutrition and health. The wording was inspired by an analogy to extrinsic and intrinsic mortality in evolutionary biology and disposable-soma theory (Williams, 1957; Kirkwood and Austad, 2000). Yet, although

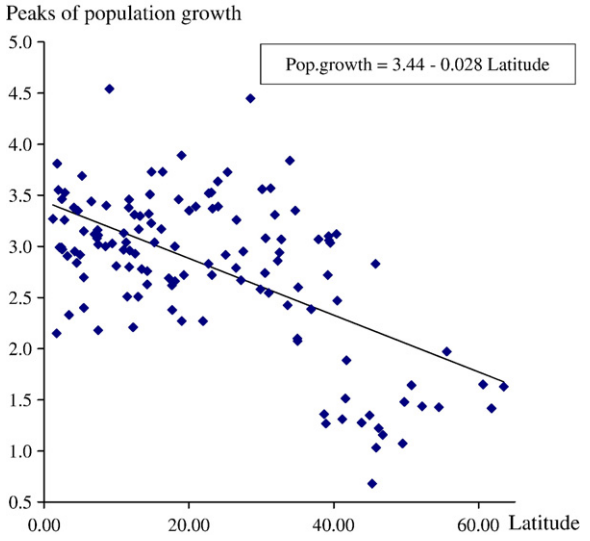

Fig. 2. Absolute latitude and historical peak of population growth for 128 countries data from Reher (2004) and Masters and McMillan (2001).