2024 ■ Number 3
https://doi.org/10.20955/es.2024.3

ECONOMIC Synopses

The Role of Infant Mortality in Closing the Life Expectancy Gap

B. Ravikumar, Senior Vice President and Deputy Director of Research
Amy Smaldone, Senior Research Associate

Life expectancy in rich countries is generally higher than it is in poor countries, but the gap in life expectancy between rich and poor countries has been closing over the past 50 years. Several economists have noted this cross-country convergence in life expectancy.[1]

Life expectancy in a given year is the additional number of years that a person at a given age could expect to live on average given the age-specific survival rates in that year. For example, the life expectancy in 2023 involves using 2023 age-specific survival rates for every age; that is, the survival rates for 1-year-olds, 2-year-olds, etc. A person's life expectancy can change over their lifetime if the age-specific survival rates change.

Life Expectancy at Birth and Infant Mortality

A common measure of life expectancy is life expectancy at birth (LEB), which is the number of years a newborn could be expected to live on average. In 1970, the LEB gap between rich and poor countries was about 18 years.[2] This means that in 1970, children born in rich countries would live, on average, 18 years longer than children born in poor countries. This gap has narrowed over time: The LEB gap was only about 7 years in 2019.

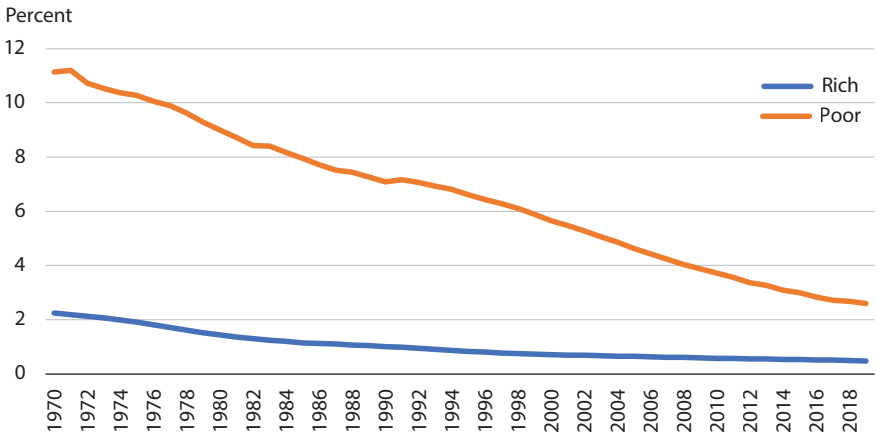
This essay describes the role of infant mortality in the cross-country convergence in LEB. The infant mortality rate (IMR) measures the number of infants who die before they reach age 1 as a percentage of live births. It is the flip side of the survival rate to age 1; or, more precisely, IMR is 1 minus the probability of surviving to age 1. The link between LEB and IMR in any year t can be represented by the following equation:

$$LEB_t = (1 + LE1_t) * \textit{probability of surviving to age } 1 \textit{ at } t,$$

where $LE1_t$ is life expectancy at age 1 and t is the year.

Similar to LEB, the IMR has converged over time between rich and the poor countries. Figure 1 shows the

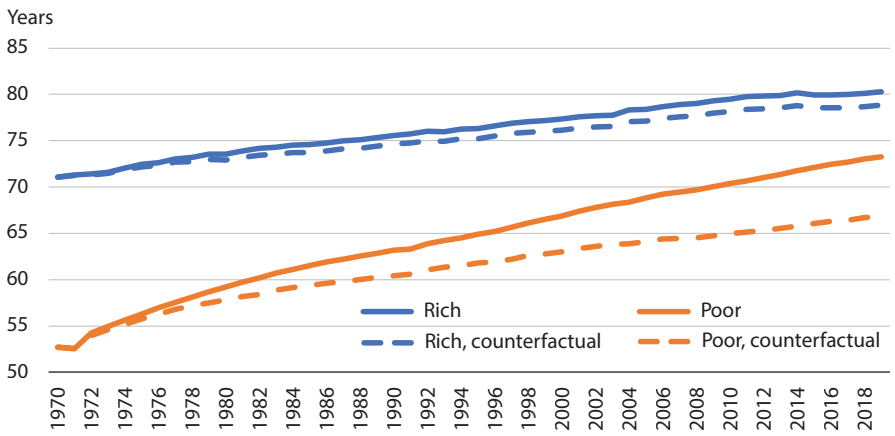
Figure 1
Infant Mortality Rate, 1970-2019



NOTE: We start in 1970 because some countries are missing data prior to that date. Poor countries are in the first quintile of the cross-country distribution of real GDP per capita in 1960, and rich countries are in the fifth quintile. We keep these groups of countries constant over time in their initial groups, even though some countries might have moved between quintiles. For each group, the yearly average infant mortality rate is weighted by number of live births in each country. The infant mortality rate is typically measured as number of deaths of infants under 1 year of age per 1,000 live births; we convert this to percent.

SOURCE: World Bank World Development Indicators, United Nations World Population Prospects, and authors' calculations.

Figure 2
Life Expectancy at Birth: Data and Counterfactual



NOTE: For each group, the yearly average life expectancy at birth (LEB) is weighted by population in each country. The counterfactual LEB curves assume that infant mortality rates are held at their 1970 levels in rich and poor countries.

SOURCE: World Bank World Development Indicators, United Nations World Population Prospects, and authors' calculations.

IMR of rich and poor countries from 1970 to 2019. The IMR gap between rich and poor countries was about 9 percentage points in 1970 but decreased to 1.6 percentage points in 2019.

A Counterfactual Exercise

We conduct a counterfactual exercise to assess how much of a role IMRs played in the cross-country convergence in LEB. Since we know LEB and IMR in every year, we can compute $LE1$ using the equation above for every year from 1970 to 2019. This results in a time series of $LE1$ for both rich and poor countries. Then suppose, counterfactually, that IMR—and therefore the probability of surviving to age 1—remained constant at the 1970 level, but that the $LE1$ time series evolved as it actually did in the data. This exercise shows what would have been the gap in LEB between rich and poor countries if IMR had not converged.

Figure 2 shows the actual LEB of both country groups (solid lines), as well as the results of this counterfactual exercise (dashed lines) in which IMRs are held constant at their 1970 levels.

The difference between the counterfactual LEB and the actual LEB is noticeable. The LEB gap in 2019, if the IMR had not changed from its 1970 level, would be 12 years instead of 7. That is, the counterfactual gap is 71% higher than the actual gap.

By comparing the actual LEB with the counterfactual LEB, we conclude that the convergence in IMR had a substantial impact on the convergence in LEB. ■

Notes

[1] Vandenbroucke (FRBSTL RE, 2022); Acemoglu and Johnson (JPE, 2007); and Becker, Philipson, and Soares (AER, 2005).

[2] We define poor countries as those in the first quintile of the cross-country distribution of real GDP per capita in 1960 and rich countries as those in the fifth quintile. We keep these groups constant over time.

Posted on February 21, 2024

ISSN 2573-2420