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Aggregate Processes of the Demographic Transition

(Pages 63-65)

In traditional societies the risk of death is high throughout life. Women bear many children, but many of them die in infancy and childhood. Population grows slowly or not at all. High mortality risks and low growth rates produce a young age distribution, with relatively many young people and relatively few old people. Fertility, mortality, and age distribution are in approximate long-term equilibrium. Numbers of births and deaths may fluctuate sharply from year to year, but long-term averages are reasonably stable.

In modern societies women bear on average about two children each and almost everyone survives to old age. Population again grows slowly or not at all. Under modern demographic conditions, however, slow growth combines with low mortality to produce an old age distribution, with much larger numbers of elderly persons. Fertility, mortality, and age distribution are again in approximate equilibrium.[2]

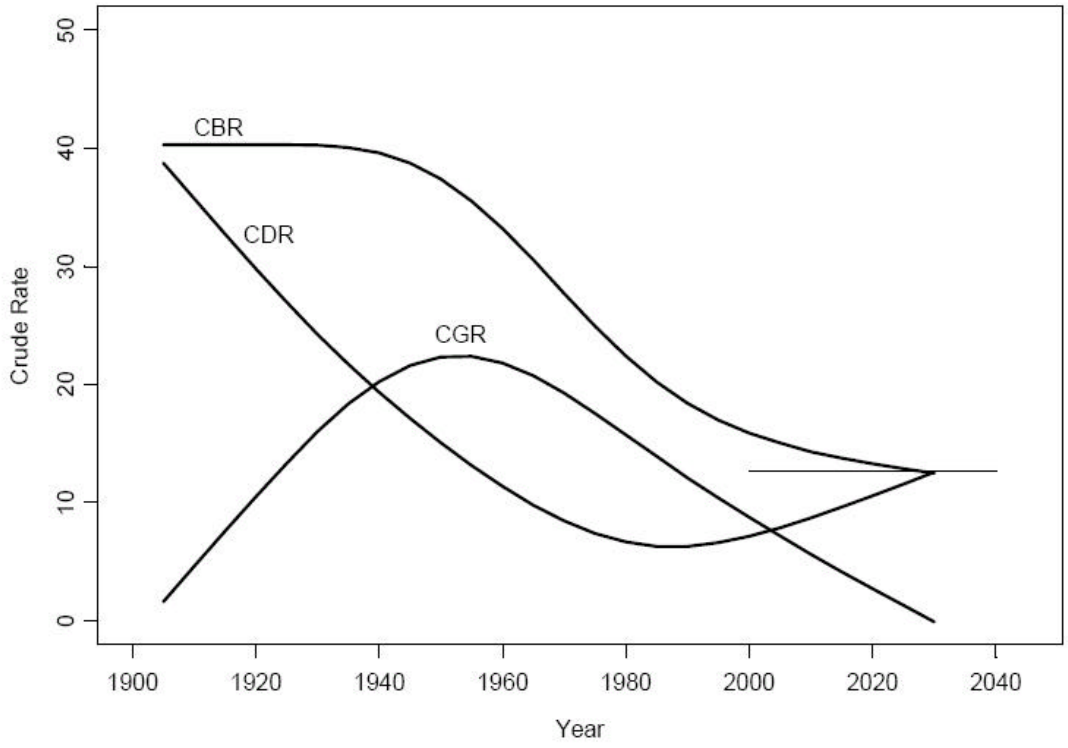
Between the traditional and modern regimes comes the demographic transition. In the simplest account death rates begin to decline while birth rates remain high, resulting in a surge in population growth. After a time birth rates decline as well, and population growth eventually subsides.

The process is complicated, however, by changes in a population's age distribution. Figure 3.1 shows birth, death, and growth rates in a simulated demographic transition modeled loosely on the experience of Taiwan. At the beginning of the twentieth century birth and death rates were nearly equal, yielding a population growth rate near zero. As is conventional among demographers, rates are expressed as annual births, deaths, and net increase per 1,000 persons in a population. The transition begins with declining death rates. Birth rates do not change initially, and so population growth rates rise. The birth rates in Figure 3.1 begin to decline after about 40 years, but growth rates continue to rise for another 10 years or so until declining birth rates outpace declining death rates.

In our simulation life expectancy at birth rises from *25* years in 1900 to 73 years in 1990 and remains constant thereafter. The level of fertility declines from 5.5 children per woman in 1955 to 2.0 children per woman in 1990 and remains constant thereafter. As is apparent from Figure 3.1, however, the transition does not end with the stabilization of mortality risks and the average number of children born per woman.[3] Although the population growth rate declines substantially from its peak 90 years after the beginning of the transition, it continues to decline for another 40 years, during which time population growth continues. The birth rate continues to decline during this period, but the death rate rises. This unexpected rise in the death rate is explained by changes in the population age distribution. Ninety years into the transition, changes in fertility and mortality have resulted in an age distribution that is much younger than the equilibrium age distribution for the current levels of fertility and mortality. The age distribution has not caught up with changes in fertility and mortality. The catching-up process takes about 40 more years, during which the population age distribution grows steadily older. This aging pushes more and more people into the oldest age groups, where mortality risks are highest, and the death rate therefore rises. Population aging lowers the birth rate as well, but the effect here is less pronounced.[4]

The population growth that occurs during the last 40 years of this modeled demographic transition is a manifestation of *population momentum.* The term, adopted by analogy from the physics of moving bodies, refers most often to a tendency for population size to continue to grow after fertility rates have reached replacement level. More generally, population momentum

Figure 1: Stylized Demographic Transition



refers to population change that results from an imbalance between the current age distribution and current levels of fertility and mortality (Preston and Guillot 1997). In the demographic literature momentum often refers only to the impact of a population's age structure on its birth rates. The impact of age structure on death rates is neglected. Here, the impact of age structure on death rates is as important as its impact on birth rates.

The demographic transition model provides a useful point of departure for a more detailed assessment of demographic changes in East Asia. In the following sections we examine mortality and fertility change with an eye to assessing whether East Asia's demographic experience is distinctive.

Notes

2. Not all traditional societies are demographically identical, of course, and all experience fluctuations in levels of fertility and mortality. The same is true for modern societies. Nevertheless, the differences between traditional and modern demographic in the face of empirical variability. For example, the level of fertility in traditional societies almost never falls below four births per woman, and the level of fertility in modern societies almost never rises above three births per woman. In traditional demographic regimes 20% or more of all children born typically die before reaching their first birthday, and this figure would rarely fall below 15%. In modern demographic regimes the same figure would almost never be as high as 5%.

3. "Stabilization" is a considerable, if justifiable, simplification. In the centuries-long perspective of the demographic transition, levels of fertility and mortality in developed countries have stabilized. Changes that appear small in this context, however, may loom large when the focus is on the current situation in developed countries. Mortality risks continue to

decline, and there is the possibility that the length of life may be considerably extended. Fertility levels in developed countries fluctuate substantially, if at much lower levels than in the more distant past. The level of fertility in many developed countries falls short of population replacement, giving rise to concerns of population decline and excessive population aging.

4. Stylized depictions of the demographic transition appear prominently in the demographic literature, but the increasing death rates that occur during roughly the last third of the transition have generally been ignored or stylized out of the picture. See, for example, Coale (1974: 23), Thomlinson (1976), Keyfitz (1977: 24), McNamara (1982: 146), Nam and Philliber (1984: 43), Stockwell and Groat (1984: 37), Weeks (1989: 74), and Cleland (1994: 232).

References

Cleland, J. 1994. "Different Pathways to Demographic Transition." In F. Graham-Smith, ed., *Population: The Complex Reality—A Report of the Population Summit of the World's Scientific Academies.* Cambridge: Cambridge University Press.

Coale, A. J. 1974. "The History of World Population." In *The Human Population: A Scientific American Book*, pp. 15–25. San Francisco: W. H. Freeman.

Keyfitz, N. 1977. *Applied Mathematical Demography.* New York: John Wiley & Sons.

McNamara, K. 1982. "Demographic Transition Theory." In J. A. Ross, ed., *International Encyclopedia of Population,* v. 1, pp. 146–7. New York: Free Press.

Nam, C. B., and S. G. Philliber. 1984. *Population: A Basic Orientation,* 2d ed. Englewood Cliffs, NJ: Prentice-Hall.

Stockwell, E. G., and H. T. Groat. 1984. *World Population: An Introduction to Demography.* New York: Franklin Watts.

Weeks, J. R. 1989. *Population: An Introduction to Concepts and Issues.* Belmont, CA: Wadsworth.